THE AMERICAN
GAS LIGHT JOURNAL

VOL. XCVI., No. 25. NEW YORK, JUNE 17, 1912. WHOLE NO. 1,932.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

The Technique of Gas Manufacture, by Mr. Alfred E. Forstall..... 407
Suggestions on Storing Coal..... 412
Proceedings, Eighth Annual Meeting, Illinois Gas Association—
Continued from Page 396..... 413
First Day, Morning Session—Co Operation, by Mr. W. L. Powers—Discussion—First Day, Afternoon Session—Illumination of Peoples Gas Building, Chicago—*Volumetric Changes that Occur in Measuring Fluid in the Transmission of Same at Time of Test Through Gas Meters That Have Been in Service, by Mr. C. C. Schiller—Discussion—Getting New Business, by Mr. Edward Curry—Discussion.
EDITORIALS—
Death of Mr. William Reynolds Beal..... 418
Briefly Told..... 398
*A Fish Story—Company Membership in the National Commercial Gas Association—Current Mention.
Proceedings, Fourth Annual Meeting, Southern Gas Association—
Continued from Page 403..... 421
First Day, Morning Session—Discussing the Congdon Paper—Appointment of Special Committees.
Gas as a Fuel, by a "Manchester Man"..... 423
MANAGEMENT AND COMMERCIAL METHODS..... 424
A Novel Use for Water Gas Tar.
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 424
The Montreal Men are Satisfied—Respecting the Gas Supply of Cayuga, N. Y.—Mr. J. F. Stratton to Succeed Mr. R. W. Waite—Annual Meeting, Georgetown, D. C.—Mr. Snow Receives a Watch—A Suit—The Harvard Ayer (Mass.) Gas and Electric Company—Directors of Cincinnati Gas Transportation Co.—Some Provisions of New Franchise Grant, Elgin, Ills.—Mr. Detweiler Goes to the Coast—President Ellis Home and not Ready to Sell—The Bond Issue in Connection with Sale of Nashville (Tenn.) Plant—Mr. H. M. Papst will Build the New Works for Portland, Ore.—Mr. W. F. Croston takes Charge at Watertown, N. Y.—Contracts for the Gas Machinery Co.—The Wallace Syndicate will Build at Corpus Christi, Tex.—And Other Items.
The Market for Gas Securities..... 426
Meeting Times of the Various Gas Associations..... 426
Public Lighting Table for June, 1912 (Advertising Section)..... 27

The Technique of Gas Manufacture.

[Lecture Delivered by MR. ALFRED E. FORSTALL, During Celebration of the Centenary of the Introduction of Gas as an Illuminant, Franklin Institute, Philadelphia, Pa., April 19, 1912.]

Until the Seventeenth Century the store of human knowledge as to the aeriform substances, which are now named gases, was practically confined to that of the more striking physical properties of the atmosphere and its corroding effect upon metals, especially when they were heated.

Van Helmont (1577-1674) was probably the first to understand the existence of aeriform bodies distinct from ordinary air. These he called spirit, and in his writings he mentions bodies almost entirely composed of spirit which was fixed and solidified in them. To this spirit he gave the name of "gaz." According to Priestley, Van Helmont derived this name from the German word "geist" meaning spirit, but a later writer claims to have found a statement of Van Helmont connecting the word with "chaos."

Apparently the first published assertion as to the composition of the atmosphere was made (1665) by Hooke, who stated that air contains a principle similar to, if not identical with, that of niter. He also seems to have recognized that only a certain portion of the atmosphere is required to support combustion and respiration. The precise experiments on respiration, published by Mayow in (1670) greatly strengthened this conception of the complex nature of the atmosphere, but in spite of the incontestable facts he presented this truth was not fully recognized until more than a century afterwards.

Boyle extended the knowledge of the physical and chemical constitution of air by the work described in his treatise, published between 1672 and 1692. About 1770, Rutherford demonstrated the existence in the atmosphere of nitrogen and shortly afterwards Priestley separated oxygen from red oxide of mercury. The significance of this discovery, in relation to the constitution of air, was clearly demonstrated by Lavoisier, who, by heating mercury in contact with a measured volume of air, showed that about one-fifth of this volume was taken up, with the formation of the red oxide of mercury, and that the remaining four-fifths had all the properties of the "mephitic air," or nitrogen, of Rutherford.

Hydrogen was recognized as an individual gas, by Cavendish (1766), and its name was given to it by Lavoisier.

During the Seventeenth Century some progress was made in determining the identity of carbon dioxide as distinct from atmospheric air, and in recognizing its various occurrences as the result of fermentation and combustion, and, as collected in subterranean and inclosed places at a low level, and as the cause of the sudden deaths known to occur in such places but previously ascribed as the acts of an evil spirit.

Van Helmont is stated by some authorities to have known the identity of the gases from these sources, but according to others these facts were not fully known until nearly the end of the Eighteenth Century. The composition of carbon dioxide was finally determined by Lavoisier.

The existence of fire damp, the name being obtained from the fact that this "damp" or vapor was inflammable, in connection with marshes and coal seams, had been known at an earlier date, but Thomas Shirley seems to have been the first Englishman to examine carefully the properties of this important constituent of illuminating gas, now known chemically as methane, and generally as marsh gas, or carburetted hydrogen. In 1667 he published in the *Philosophical Transactions* an account of his investigation (1659) of the phenomena occurring in a burning spring near Wigan in Lancashire. Shirley demonstrated that the combustible matter was a gas bubbling through the water, which gas he collected from the ground after the water had been diverted into another channel. After this publication many similar observations were made as to the formation of methane by the decomposition of vegetable matter.

One of the earliest observers of the fact that the distillation of carbonaceous matter yielded a combustible gas was Boyle, who found that, when distilled, wood yielded oil, spirit, phlegm (steam) and water. The Rev. John Clayton, in a letter written to Boyle and which, although only published in the *Philosophical Transactions* in 1739, must have been written before Boyle's death in 1691, describes experiments in distilling coal undertaken as a result of seeing gas escaping from a ditch near Wigan which was found to be underlain by coal. He used a retort and obtained first, phlegm (steam), then black oil and then a "spirit" which could not be condensed, and gradually accumulated until the pressure forced the lute and broke his glasses. The accidental ignition of the escaping gas proved that it was inflammable. By storing some of it in bladders he found that both it and its property of inflammability were permanent.

In 1726 Dr. Stephen Hales distilled wood and coal and noted the toxic effect upon animals of the "air" produced. He states that from Newcastle coal he obtained one-third of its weight of "air," but since

this coal, even with improved methods of distillation, yields only one-fifth of its weight of permanent gas, some condensable products must have been included in this amount.

In 1767 Dr. Watson published some essays in which he speaks of the giving off of "air" during the distillation of coal.

Even at this comparatively late date, gases were thus spoken of as "air," and although the name "gas," suggested by Van Helmont for these bodies, was defined in Macquer's "Chemical Dictionary," published in 1771 as the "name given by chemists to invisible parts which escape from certain bodies;" this name was not used generally until some time after it was adopted by Lavoisier in 1786.

The discovery that the distillation of coal and other carbonaceous substances produced an inflammable and more or less luminous gas was thus made prior to 1690, but it was not until nearly 100 years later that the idea of using this gas for illuminating purposes was conceived. Then this use seems to have been thought of independently by several persons in different countries at about the same time, and consequently there is a dispute as to who should be accredited as having been the originator of the use of coal gas as an illuminant.

Apparently J. P. Minckelers, a Professor in the University of Louvain (Belgium, in 1784), distilled powdered coal, for the production of inflammable air which he used to fill balloons. In a report advocating the use of coal gas for aeronautical purposes, in which he was particularly interested, he is said to have mentioned the fact that the gas might be purified by being passed through lime water and could then be used for illuminating purposes. It is also claimed that records in the archives of Louvain show that (1785) Minckelers lighted his lecture room with inflammable air produced by the distillation of coal.

Phillippe Lebon distilled wood and coal in 1786, and in 1799 took out a patent for "a new method of employing fuel with greater utility, either for heating or lighting and to obtain certain products therefrom." The apparatus described in this patent was not very practicable, and in 1801 he obtained a certificate of additions. In this certificate he calls the apparatus a "thermolampe" and apparently his main idea was to obtain inflammable gas with the object of producing motive power by means of its explosion, and little importance was attached to the gas as a means of lighting. For lighting purposes he described a means of consuming the gas inside a glass globe into which gas and air were led by separate pipes and from which the products of combustion escaped by a third pipe. Such a complicated apparatus was not suitable for ordinary use, but his exhibition of lighting by this method, given in Paris in 1802, was written up in glowing terms by the Parisian newspapers and in this way attracted attention all over the Continent of Europe.

The earliest patent taken out in England, in connection with the distillation of coal, was that of Lord Dundonald, for the production of different substances from the distillation of coal, obtained in 1785. His object, however, was the production of tar and while he is said to have lighted the hall of Culross Abbey with crude coal gas in 1787 he apparently did nothing further along the lines of illumination by means of coal gas.

William Murdock, who is accredited in Great Britain and among English speaking countries as being the originator of the use of gas for illuminating purposes, apparently began experimenting along this line at Redruth, Cornwall, in 1792. In that year he distilled coal, peat, wood and other carbonaceous bodies and, being impressed by the quantities of gas given off during the distillation, and the facility with which a brilliant light was produced by this means, he made experiments to determine the relative costs of light so obtained and that obtained from oils and tallow. In 1797 he lighted his own premises in Old Cummock, Ayrshire, with coal gas. Becoming connected with the firm of Boulton and Watt, quite prominently identified with the development of the steam engine, he lighted with coal gas (1789) one of the principal buildings of their plant at Soho, Birmingham, and in 1802, in celebration of the Peace of Amiens, the Soho works were strikingly and, for the period, brilliantly illuminated by means of that gas.

Apparently Minckelers and Lebon, while working with other objects in view, preceded Murdock in their experiments with, and demonstrations of, illumination by means of coal gas; but the latter was the first to work with illumination as the main object.

Through Lebon, however, the man who probably was the greatest factor in hastening the introduction of the public supply of gas became interested in the subject. This man (Frederick A. Winsor), seeing, in one of the European newspapers, a description of Lebon's exhibition, was struck by the possibilities of the process, and, going at once to Paris, saw the light and tried to obtain from Lebon information as to the method of producing it. It was, however, impossible for him to pay the high price asked, and Winsor left Paris disappointed but determined to find out the causes of such important effects and results.

By the next year he had obtained a certain amount of knowledge on the subject, and gave in Brunswick exhibitions of the lighting effect of gas produced by the distillation of wood. At this time he was seized with great force with the idea that England was the most favorable field for the exploitation of the process, and, acting promptly on this thought, went to London and there gave (1804), at the Lyceum Theater, lectures and exhibitions on gas lighting. Although working under difficulties, and at first without much success, partly because of his extravagant claims, Winsor persisted in his efforts to promote and finance a National Light and Heat Company, and was finally reported to have obtained nearly £50,000, all of which was expended in the furtherance of his plans. In 1809 he lighted with gas a portion of Pall Mall, this being the first public street lighted by means of coal gas.

While Winsor was thus working to interest capital in a company to exploit gas lighting over the whole area of Great Britain, attention was also being called to this means of lighting by the lectures of various chemists, and practical applications of the process were being made in various cotton mills by Murdock and by Samuel Clegg. Even with the crude apparatus employed, lighting by coal gas was found much cheaper and more brilliant than that obtained, according to the general practice of the day, by the use of candles.

In 1809 Winsor and his associates applied to Parliament for a charter for a company to supply gas over the whole of Great Britain. Murdock, who claimed that priority of invention entitled him to the charter if any were granted, opposed this application, and it was denied, but another, made in 1810 by Winsor and his associates, resulted in the passing of an act authorizing the King to grant, within 3 years, to the London and Westminster Chartered Gas Light and Coke Company, a charter covering London, Westminster, Southwark and the adjacent suburbs. The capital was fixed at £200,000, to be raised in full within 3 years after the granting of the charter, while £100,000 had to be raised before the Company could commence operations.

The Company finally obtained its charter on April 30, 1812. Its operations were not successful at first, but in 1813 progress began to be made, and by 1815 the Company had installed three manufacturing plants and 15 miles of street mains. Other companies were soon organized, and the business of supplying gas progressed so rapidly in Great Britain that by 1829 more than 200 gas companies had been formed.

The first use of coal gas as an illuminant in the United States is said to have been made in Philadelphia, in 1796, but the first definite record of such use in this country is the lighting (1806) by David Melville, of his house in Newport, R. I., with gas made by himself. In 1810 he obtained a patent for "A gas lamp for lighting manufactories, mills, theaters, etc., with hydrogen gas, or inflammable air produced from pit coal," and in 1813 he lighted with gas some mills in the vicinity of Newport.

The first gas company in the United States was organized in Baltimore (1817), and this was followed by the organization of companies in Boston and New York; but, because of the comparative cheapness of other illuminants, progress was slow, and up to 1830 these were the only cities that had gas works.

I have been unable to find any description of manufacturing apparatus specifically stated to be that employed in the first works of the Chartered Gas Light and Coke Company. It is probable, however, that the apparatus described in "A Practical Treatise on Gas Light," published by Frederick Accum (1815), as being calculated for lighting towns or large districts of streets and houses, is, even if not exactly the same, very similar to that which was installed in these works, because Accum was the first Engineer of the Chartered Company, and refers throughout this book to information obtained from Samuel Clegg, who was his successor.

In this apparatus the coal was distilled in cast iron retorts about 15 inches in diameter and 3 or 4 feet long, placed in sets of 2 in the flues of fireplaces, built under the backs of the retorts, in which coal fires were maintained. The fronts of the retorts opened into a chamber, shut off from the operating floor by means of a brick wall, through openings in which the work of drawing and charging was done, the coke falling, as it was drawn, through a hole in the bottom of this chamber into a space below the operating floor. The gas leaving the retorts passed through so-called syphon tubes, with a diameter of probably less than 3 inches, into the horizontal con-

denser or hydraulic main. The lower end of the syphon tube, or of the dip-pipe, was sealed by the accumulation of the liquids condensed from the gas in the hydraulic main until they passed off over the top edge of a partition plate, set at a level above that of the bottom of the syphon tube. From this condenser the gas was carried by a take-off pipe to a pipe coil placed in the water in the space between the holder and the tank. After being cooled in this coil, the gas was led into a lime machine while the condensed liquids ran into a tar cistern. In the lime machine the gas was caused to bubble through lime water by which the sulphur compounds were removed. Upon leaving the lime machine the gas was passed through a small washing apparatus, placed inside of the holder, from which it escaped into the interior of the latter.

The holder bell probably had a capacity of about 14,000 cubic feet, and was made of light sheet iron, fastened to a rectangular frame, formed of wooden struts and iron bars, while the tank was apparently made by lining with wrought iron the foundation walls of the building in which the holder was enclosed.

The street mains were made of cast iron, spigot and faucet, or bell-and-spigot pipes, the joints being made with either iron, cement or lead.

Service pipes, up to a diameter of 1¼ inches, were made of tubes of welded wrought iron in 3-foot lengths, with wrought iron fittings and screwed joints. For house piping tubing, made either of sheet iron brazed, of lead or of copper with lap-over joints, was used. Copper with brass fittings was recommended by Peckston for interior work, with wrought iron tubing for pipe exposed to the weather. The burners were either cockspur, consisting of 3 round jets, a single round jet, batswing or Argand.

In the 1819 edition of Peckston's *Theory and Practice of Gas Lighting* it is stated that the general mode of charging customers for light was at a certain sum per annum for burners of given dimensions, burning from sunset until a stipulated hour, but that this was not satisfactory, and that meters for measuring the actual amount of gas used were being gradually introduced, a suitable meter having been brought out in 1817.

In a modern coal gas plant the retorts in which the coal is carbonized are made of clay, are D-shaped, with a height of about 16 inches, a width of 24 to 28 inches and a length of 9 to 10 feet, for what are known as single retorts, or from 11 to 20 feet for what are known as through retorts. They are set in groups of from 6 to 12, each group or bench being heated by means of a generator furnace equipped with recuperators. As a rule the long axis of the retort is horizontal, but that of through retorts is sometimes inclined about 32° from the horizontal, and during the last 5 years the practice of having this axis vertical has been quite largely adopted. In smaller works the coal is charged into, and the coke drawn from, the retorts by hand, but in larger works these operations are performed by machinery. The stand, bridge and dip pipes, through which the gas passes from the retorts to the hydraulic main, have a diameter of 7 or 8 inches. Except for details of construction adapted to insure the sealing of the dip pipes in ammoniacal liquor the hydraulic main remains much the same as in the early works.

The amount of apparatus between the hydraulic main and the holder has been greatly increased from that in the original plants in order that the removal of tar, the cooling of the gas and the removal of ammonia and of the sulphur compounds may all be efficiently effected.

In the United States the first piece of this apparatus is often a primary condenser or cooling vessel, employing air as the cooling medium. Either following this condenser, or being itself first in the series is an exhauster or gas pump, which relieves the retorts of the pressure thrown by the holders and the friction developed as the gas passes through the apparatus between the exhauster and the holder. From the exhauster the gas passes into a frictional tar extractor, then to the secondary condensers, which are usually water cooled, and then to the washers or scrubbers for the removal of ammonia by solution in water, a washer being a vessel in which the gas is caused to pass through water in small bubbles while a scrubber is one in which the gas passes in thin streams over surfaces kept wet with water. Leaving the scrubbers the gas goes to the purifiers, where it is freed from sulphureted hydrogen by means of the chemical affinity between this substance and the oxide of iron which forms the active portion of the purifying material customarily used. After passing the purifiers the gas is measured by large wet meters and then passes to the holders which, except in the smallest plants, are made with more than one lift, and for large plants vary in capacity from 1,000,000 cubic feet to the 15,000,000 cubic feet of the largest holder in the world, that at the works of the Astoria (L. I.) Light, Heat and Power Company.

In some of the larger works rotary scrubbers for the removal of cyanogen and naphthaline are also provided.

The change from the simple plant described in Accum's Treatise to the more complete modern one was made gradually as knowledge was gained concerning the principles involved in the distillation of coal and the subsequent treatment of the volatile products of such distillation. These principles are treated of later.

About 1850 clay retorts began to replace iron ones, because of their ability to withstand a much higher temperature, and so make possible a much larger production of gas from a given quantity of coal. The temperature to which the retorts could be heated was increased and economy of fuel obtained by improvements in the design of the furnaces and in the method of setting the retorts. The greatest advance, however, in securing both intensity of heat and economy of fuel, came with the introduction of generator firing and the preheating of the air used for combustion by means of the heat contained in the waste gases passing to the chimney. While one of the earliest experiments with gaseous firing for heating retorts was made in 1862, when a Siemens' regenerative furnace was used for the purpose at one of the gas works in London, this method of heating was developed on the Continent of Europe. The Siemens' furnace was too elaborate for general use, but simpler generators and recuperators were soon devised, and by 1874 had been adopted in about 20 works. After that time the progress was rapid on the Continent, but up to 1878 there was practically no gaseous firing in either England or the United States. In that year Dieterich furnaces were installed in one of the gas works in Baltimore, and experiments, apparently not very successful, were made in several places with other furnaces, but success was obtained in the early eighties and after 1885 the use of generator furnaces and recuperators became general in the larger coal gas plants.

The exhauster, first introduced in 1841, came into general use at the same time as clay retorts. Its use is required because a high pressure on the hydraulic main, coupled with the bubbling of the gas through the hydraulic seal on the dip pipes, produces in the retorts great fluctuations in pressure and a consequent pulsation of the gas passing off from the coal, which increases very greatly the extent of its contact with the hot walls of the retorts and the destructive breaking down of valuable hydro-carbons by reason of this contact.

The change from the condensing coil placed in the gasholder tank to the form consisting of vertical pipes connected at the top in pairs by return bends, and at the bottom into a cast iron box with suitable partitions, came before 1841. This form, while still commonly used in Great Britian, has been superseded in the United States by condensers in which the gas passes through an enclosed space traversed by tubes or pipes, the cooling medium being either water or air flowing through these tubes.

It is uncertain when washers and scrubbers were first introduced for the purpose of absorbing ammonia. Washers, apparently placed ahead of the condensers, were used at some works before 1841, but they were tar extractors rather than ammonia extractors. By 1853 tower scrubbers filled with coke were being used, but also seem to have been intended more for the removal of tar than for that of ammonia. By 1868, however, the use of tower scrubbers, for the removal of ammonia from the gas before it entered the purifiers, seems to have been thoroughly established. Rotary scrubbers were introduced shortly after 1880, and have been adopted in the larger plants.

The change from wet to dry methods for the removal of sulphureted hydrogen and other sulphur compounds, advocated as early as 1817, had not become general in 1841, but the use of dry lime was generally adopted soon after that year and, from 1850 on the use of oxide of iron as a purifying material became quite common. In recent years it has been almost the only material employed for this purpose.

The use of station meters began soon after 1815.

The increase in the amount of gas sold, and the difficulty of securing ground space in the crowded neighborhoods in which the early gas works were built, gradually led to the use of holders of more than one lift and the capabilities of the older methods of guiding holders, that is of providing against their being upset, were soon outgrown. At first holders were guided either by the sliding along a central post of an open pipe with its lower end sealed in water, or by means of chains attached at different points around the circumference of the crown and led over grooved wheels to be fastened to a single weight which descended as the holder was raised. Later the guiding was by means of wheels or rollers fastened at points equally distant around the outer edge of the crown and the bottom curb and working against rails or plates attached to the tank wall and to columns, each composed at first either of a single cast iron cylinder, or in some cases of groups of cast iron columns joined together by struts, and later of a single wrought iron cylinder, the columns whatever their form of construction being joined at the top by means of wrought iron girders.

The lastest style of guide framing, which came in use with the adoption of holders of more than two lifts, consists of structural steel columns joined to each other by several series of horizontal struts and diagonal ties in such a way that the whole frame may be considered as forming a rigid cylindrical cantilever.

At about the same time that the modern system of guide framing was adopted the use of steel tanks built largely above ground in place of the brick tanks built below the level of the ground also began to come largely into use in the United States.

Until recently the comparatively small retorts employed in gas works formed the sole source of coal gas, but now the by-product, or retort, coke oven used in the manufacture of coke also affords a supply of such gas for illuminating purposes. When first introduced all the gas produced by these ovens was consumed in the plant itself, but shortly after 1896 the sale of surplus gas for illuminating and heating purposes was begun in Glassport, Pa., and in 1899 this sale on a large scale was entered into by the New England Gas and Coke Company with a plant at Everett, Mass., supplying gas to Boston and its suburbs. Since that time other plants have entered this field until there are now 11 coke oven plants selling illuminating gas in the United States.

When the surplus gas is to be sold two separate sets of hydraulic mains and condensing and scrubbing apparatus are provided, one handling the rich gas made during the early, the other the poorer gas made during the latter, part of the charge. The rich gas is distributed while the poorer gas, after being freed from ammonia, tar and benzol, is used for heating the ovens. In one or two plants the ovens are heated with producer gas made from part of the coke and all the coal gas is sold.

Apart from the use of retort ovens, instead of retorts, the treatment in a coke oven plant of the gas which is to be sold does not differ materially from that in an ordinary coal gas plant.

The advantages claimed for coke ovens as producers of coal gas are low labor costs, because of the large weights of coal used in one charge, and the production of a quality of coke which in many localities commands a better market than does ordinary gas coke.

While in Europe the carbonization of coal furnished up to about 1894 practically the sole source of illuminating gas, and is still by far the largest source of such gas, in the United States it is second in this field to carburetted water gas. The latter gas is produced by mixing with non-luminous water gas a sufficient amount of oil gas to give the mixture the desired illuminating value.

The decomposition of steam by means of highly heated carbon, with the formation of water gas, was known before the coming into use of coal gas and was experimented upon by Fontana in 1780. After the introduction of coal gas efforts to carburet water gas were begun, and in 1847 a patent was taken out in England, by Stephen White, for the production of a combined coal and water gas. The process covered by this patent was widely discussed by gas engineers of that time and was favorably regarded by some of them, but it proved to be incapable of control and, therefore, to give very variable results, and was not a commercial success. Other processes for the production of carburetted water gas were presented but none of them were successful until in the early seventies T. S. C. Lowe devised in this country the apparatus which, although greatly modified and much improved by other men, still bears his name. The success of this apparatus is due to the principle, first employed in it, of the internal heating of the vessels required for the manufacture of the oil gas needed to carburet water gas, by the combustion in them of the combustible portion of the producer gas formed while the fuel in the water gas generator is being brought up to the temperature necessary for the decomposition of steam.

The Lowe apparatus, in which water gas and oil gas are made practically in one operation, while the conditions suitable for the manufacture of each can be separately obtained and controlled, in connection with the supply of cheap and suitable carburetting materials afforded by the large production of petroleum and its distillates, made the manufacture of carburetted water gas commercially practicable and economical in the United States, and after the installation of the first apparatus in Pennsylvania (1873) it was rapidly adopted, until at the present time it furnishes slightly more than two-thirds of the total amount of illuminating gas made and sold in this country.

The generating apparatus employed in the manufacture of this gas consists of 3 suitably connected cylindrical vessels, constructed of steel plates and lined with fireclay blocks. The first vessel, called the generator, contains the fuel and furnishes both the producer gas and the water gas required. The other two vessels, in which the oil gas is made, are called respectively, the carburetter and superheater, and are filled with firebrick piled in rows from 2 to 3 inches apart, the rows in one tier being at right angles to those in the tiers next above and below. The necessary blast, steam and oil connections are provided, and at the top of the superheater there is a take-off pipe, with its lower end sealed in water in an auxiliary vessel, and having an opening to the atmosphere that can be closed by a self-sealing lid.

A fire having been started in the generator, it is gradually filled with coal or coke, and this fuel is brought up to a state of incandescence by air blown in under pressure. Because of the deep fuel bed producer gas is formed, the combustion of which in the carburetter and superheater heats the checkerbrick in these vessels to the temperature required for the gasification of oil. When the proper temperature has been reached in all three vessels the blast is shut off, and the opening into the air from the take-off on the superheater is closed. Steam is admitted to the generator and, passing through the fire, is decomposed by the combination of its oxygen with the hot carbon, and the gas thus formed, consisting principally of carbon monoxide and hydrogen, passes to the carburetter. Oil sprayed in at the top of this vessel is vaporized by the heat and the vapors travel with the water gas through the carburetter and superheater, being converted during this travel into a permanent oil gas. The carburetted water gas thus produced must be cooled and purified, as in the case of coal gas, except that since it contains practically no ammonia it is not necessary to pass it through apparatus for the removal of that substance.

In the larger gas works the manufacture of both coal and carburetted water gas in conjunction is advantageous. The fluctuations in demand and the seasonal peak requirements can be cared for much more economically with a carburetted water gas plant than with a coal gas one, because of the smaller investment required by the former for a given generating capacity and the greater ease and economy with which it can be put into and taken out of action. In many cases it has been found that, even when the cost of carburetted water gas is greater, the cost of a properly proportioned mixture of the two will be less than the average cost of coal gas alone.

A combination plant has also the advantage of giving the company possessing it a better control of the market for coke, the main residual of coal gas manufacture, and placing it in a position to take advantage of fluctuations in the prices of coal and of petroleum because of its ability to vary the amount of gas made from either of these raw materials. Owing to these advantages of the combination plant almost all of the companies in the United States, manufacturing more than 50,000,000 cubic feet of gas per year, make both coal gas and carburetted water gas.

For many years gas has been made by the distillation, in retorts, of petroleum and other hydrocarbon oils, such as the Scotch shale oils, but this gas was used only for such special purposes as the lighting of railway cars or the enrichment of coal gas, the amount so used forming a small proportion of the total amount of gas distributed. In California, however, the high price of all carbonaceous materials, except petroleum, led (about 1900) to experiments which resulted in the development of a process by means of which is made, from crude petroleum, or one of its heavier distillates, as the sole raw material, a gas very similar in its composition to coal gas, but very different from that produced by distilling oil in retorts.

The generating apparatus employed in making this gas is similar to that employed in the manufacture of carburetted water gas, and consists of 2 cylindrical steel shells lined with fireclay blocks and filled with checker brick. The heat required for the gasification of the oil is obtained by the combustion, by means of air supplied under pressure at suitable points, of oil sprayed in through burners placed around the circumference of the primary generator near its top. When the proper temperature has been reached the blast valves, and the stack valves at the top of the secondary generator are closed, the supply of oil through the heating burners is stopped and oil is sprayed in through other burners at the top of the primary generator, and also at either the bottom or the top of the secondary generator. Because of the large amount of contact with the highly heated surfaces of the checkerbrick to which the oil vapors and gas first produced are exposed, from 20 to 25 pounds of carbon in the form of lampblack are set free per 1,000 cubic feet of gas made, and the handling and disposal of the carbon, which is used as boiler fuel or as the generator fuel for the manufacture of carburetted water gas to be mixed with the oil gas and, in some places, is made into briquettes and sold for fuel purposes is a problem connected with this process.

This method of manufacturing gas requires the use of from 10 to 14 gallons of oil per 1,000 cubic feet, as compared with about 4 to 5 gallons of oil per 1,000 cubic feet of carburetted water gas, and so is economical only where the cost of the extra 6 to 9 gallons of oil is less than that of the 30 to 50 pounds of coal which would be required for making the water gas portion of carburetted water gas.

Another source of illuminating gas which has been availed of to some extent both in the United States and in Germany is the distillation of wood.

Wood gas was made, in the Philadelphia Gas Works, continuously

from 1854 to 1864 and during several years of this period formed about 5 per cent. of the total amount of gas made. It was also the only gas that could be manufactured in several southern cities during the Civil War. In these instances it was made as a substitute for coal gas, the wood being distilled in retorts similar to those used for distilling coal.

At the works of the Mutual Light Company, in New York City, wood gas was made from 1879 to 1884, as a substitute for water gas. The wood was distilled in L-shaped retorts, so charged that gas given off in one part of the retort passed through a mass of heated charcoal in another part. This produced a non-luminous gas which was carburetted with oil gas. A similar retort and method of operation used in the Riche process were recently patented in France which, however, is claimed to produce gas of a fair illuminating value.

At the present time wood gas is being distributed in a small town in Washington, but apart from special local conditions cannot be produced as cheaply as other gases.

As a result of a widespread belief that there was a market for a fuel gas of lower calorific value and cheaper cost than ordinary illuminating gas, many attempts were made, between the years 1880 and 1896, in 27 different towns in the United States to distribute either blue water gas or water gas partially enriched with oil gas to give it greater calorific value. The calorific value of the gas, so distributed, ranged from about 300 B. t. u. per cubic foot, for the blue water gas, to as high as 450 B. t. u. for the partially enriched gas. Many of these attempts were made after the introduction of incandescent gas lights, so that the gas could be used, and its use was advocated, for lighting as well as for fuel purposes, but in no instance was the effort to sell such a gas commercially successful and the companies undertaking it soon went out of business or turned to the manufacture of illuminating gas. This result was reached even in the few instances where this fuel gas, being the only gas supplied in the locality, did not have to compete with any other form of gas.

These attempts to distribute fuel gas of a comparatively low calorific value failed because the cost of a given number of heat units could not be made sufficiently lower than that of the same number derived from a gas of a higher heating and illuminating value to counterbalance the disadvantages of having to consume larger quantities of gas and take a much longer time to do the same amount of work.

No attempt to distribute gas of low calorific value has been made in the United States since 1897, but there is in England a company which was organized about 6 or 7 years ago for the purpose of supplying to a populous manufacturing district "Mond gas" for use by large consumers for power and fuel purposes. "Mond gas" is a producer gas made by passing through a bed of incandescent fuel air mixed with as much steam as it is possible to use without reducing the temperature of the fire below the point at which the decomposition of the steam with the formation of water gas will take place. It contains about 40 per cent. of combustible matter, mixed with a total of 60 per cent. of nitrogen and carbon dioxide, and, has a calorific value of about 156 B. t. u. per cubic foot. The use of the large amount of steam leads to the formation of large quantities of ammonia, and the recovery and sale as a residual of this ammonia constitute one of the principal features of the process, which can only be used on a large scale, and it was thought that the recovery of the ammonia and the large scale working would make it possible to sell the gas at a price at which it would be attractive to users of fuel and at the same time pay a good return on the investment. As late as 2 years ago, however, the annual report of the company showed that the operating expenses had been barely met, and that nothing was being earned upon the investment. The low cost of manufacture and the comparatively small investment in manufacturing apparatus seem to make it impossible to meet the relatively larger distribution costs and investment and still compete with isolated plants.

Analyses of some of the various kinds of gases mentioned above are given in the appendix.

The problem of the destructive distillation of carbonaceous bodies for the production of gas for illuminating and heating purposes has 2 distinct divisions, the first being the proper application of heat to the material in order to secure the greatest possible quantity of gaseous products of good quality, the second being the proper treatment of the volatile portions of the products of distillation in order to conserve in the gas the greatest possible amount of light and heat giving bodies.

The determination of what constitutes the best possible heat treatment to apply to the raw material is rendered difficult by the complex nature of the reaction which takes place when coal or any other material, consisting largely of carbon and hydrogen, is heated to a high temperature without any access of air.

A clear knowledge of the character and effect of heat upon, the substances called hydrocarbons is requisite for the successful solution of the problem. The hydrocarbons with which the manufacturer of coal gas is concerned belong to 5 groups, each group consisting of a number of substances which resemble each other in composition but have varying densities and boiling points. These groups are the paraffines, with a composition represented by the formula Cn H2n + 2; the olefines with a formula of Cn H2n; the acetylenes with a formula of Cn H2n — 2; the benzene series with a formula of Cn H2n — 6, and napthaline. In the paraffine group the affinities of the carbon atoms are fully met by the hydrogen atoms, consequently they are known as saturated hydro-carbons, and are more inert than the members of the other groups in which the affinity of the carbon is not so fully satisfied by the hydrogen contained in them. In each group the bodies containing the smaller number of carbon atoms in the molecule have the lower densities and boiling points.

The lower members of the paraffine, olefine and acetylene series are all gases, while the higher members of these series and all of the benzene series are liquids, and naphthaline is a solid, at ordinary temperatures and pressures. Certain amounts of the vapors given off from these liquids and from naphthaline can be carried, however, by a gas under ordinary conditions.

The exposure of hydrocarbons to heat produces changes in composition which, in general, consist of a splitting off of hydrogen atoms and result in the formation of hydrogen and hydrocarbons simpler than the ones acted upon. The exact nature of these changes depends, however, upon the character of the hydrocarbons and the nature and intensity of the heat to which they are exposed.

It is probable that the first products of the heat action are complex hydrocarbons, largely paraffines of high density and boiling point, and that, during their passage through the retort, these, by further exposure to heat are broken down into hydrogen and simpler hydrocarbons. The primary products are either liquids or vapors at ordinary temperatures, consequently little gas would be formed if they were permitted to remain in their original condition. On the other hand excessive exposure to heat, and especially to contact with highly-heated surfaces, produces secondary reactions resulting finally in the formation of a gas consisting largely of hydrogen, through which are diffused hydrocarbon vapors, most of which will be condensed at temperatures and pressures frequently met with during the distribution of gas, and the setting free of carbon which causes much trouble in the generating apparatus. The problem, therefore, is so to adjust the conditions under which the secondary reactions occur as to secure the proper amount of breaking down while avoiding anything in excess of this amount.

Starting with a given amount of carbon and hydrogen in the raw material the heat treatment to which the material should be subjected to obtain any desired character of gas depends upon the following principles. Radiant heat tends to split up complex paraffines into simpler paraffines and olefines, and if the exposure to such heat is continued for a sufficient length of time at a sufficiently high temperature the final result is the decomposition of the complex bodies into methane, the lowest of the paraffine series, which is not affected by radiant heat, and several of the lower members of the olefine series. On the other hand, heat communicated by surface contact tends to produce from a paraffine, hydrogen and hydrocarbons of the benzene group. In each case the action is accelerated and intensified by increase in temperature of the radiant, or contact, surfaces.

The mixture of olefine and methane has a larger volume and a higher illuminating value than the original paraffine, but is exceeded in both respects by the mixture of hydrogen and benzene vapor. The latter mixture will not contain, however, sufficient hydrogen or other permanent gas to carry the vapor at the ordinary temperatures, unless some of the carbon originally present is set free and lost as far as the resulting gas is concerned.

Therefore, when a hydrocarbon gas is to be used alone, as in the case of the manufacture of coal gas, or is even to be used to enrich another hydrocarbon gas, and illuminating or calorific value is of importance, the gas and vapors escaping from the coal or other material being distilled should be exposed to the action of radiant heat at not too high a temperature, but should be proteced from contact with highly heated surfaces. When, as in the case of the manufacture of carburetted water gas, the hydrocarbon gas is to be used for the enrichment of a mixture of simple gases, which can carry comparatively large amounts of hydrocarbon vapors, contact with heated surfaces produces good results, especially when the hydrocarbons are exposed to such heat action while being carried by the simple gas, since the presence of that gas arrests the action before it reaches the point at which carbon is set free.

There is no such protecting and carrying gas present in the manufacture of oil gas as carried on along the Pacific Coast, consequently in this process the contact of the hydrocarbons with highly heated surfaces results in the setting free of sufficient carbon to form the hydrogen required to protect the remaining methane and uncombined olefines and carry the vapors of the benzene group. The setting free of a cer-

tain amount of carbon with its recovery in the form of lampblack is, therefore, an inherent feature of this process, whatever the character of the oil used as the raw material.

Even when no importance is attached to illuminating value the calorific value of the gas derived from a given quantity of material will be greater the smaller the amount of carbon set free, and since methane, one of the most important constituents of coal gas from the calorific standpoint, is not affected by radiant heat, but is decomposed by contact with hot surfaces, especially at temperatures above 600° C. (1112° F.) it is still important, when making a hydrocarbon gas by itself, to subject the gas only to the action of radiant heat and avoid as far as possible contact with highly heated surfaces.

Practice in carbonization in gas works had gradually come to agree with these principles even before they were thoroughly understood. Early in the manufacture of coal gas it was recognized that better results, as far as the production of gas was concerned, were obtained when coal was carbonized in thin layers and at comparatively high temperatures. In working along these lines, however, the portion of the walls of the retort above the charge of coal afforded a large amount of hot surface in proportion to the amount of gas being made, and as the temperature at which carbonization was carried on was increased much trouble was experienced from the free carbon produced by the action of this heated surface. To avoid this trouble it was found necessary to increase the weight of the charges placed in a given size of retort and lengthen the time during which the carbonization of the charge lasted, until finally, as a result of experience with intermittently charged vertical retorts, it has become the practice to fill horizontal retorts as completely as possible and make the duration of the period of carbonization sufficiently long to drive all of the gas out of these large charges. The gas, however, is still exposed to contact with hot coke during at least portions of the long period of carbonization and while the use of these large charges has increased both the quantity and quality of the gas produced from a given weight of coal the results obtained from them are probably not as good as could be obtained by the carbonization of coal in smaller charges with the proper exposure of the gas to radiant heat of a low intensity. The use of large charges reduces labor costs, but it is questionable whether a point is not soon reached at which any saving in this direction is more than overcome by a loss in the quantity and quality of the gas made, and it is possible that experiments with horizontal retorts, of much smaller dimensions than those now used, completely filled with coal, would show sufficiently better gas results to compensate for increased labor costs; but the continuously operated vertical retort, into which coal is introduced in small amounts at intervals of a few minutes, and in which it is possible to regulate very closely the extent to which the gas is subjected to radiant heat, seems to offer the best means of solving the problem of securing the proper heat treatment during the distillation of coal.

Even when the best conditions of heat treatment are attained the gas issuing from the retorts or other generating apparatus is a mechanical mixture, the principal constituents of which are hydrogen, methane and more complex hydrocarbons, some of the latter being vapors, with smaller amounts of carbon monoxide, carbon dioxide and various impurities and the second portion of the problem of the manufacture of a hydrocarbon gas is to so treat this mixture that, when the cooling from the high temperature at which it leaves the retort to atmospheric temperatures and the removal of the impurities have been completed, it will retain as large an amount of these hydrocarbon vapors as it is possible to carry to the consumer. The problem of doing this is rendered difficult by the fact that, being the vapors of liquids mutually soluble in each other, the combined tension of these vapors is much below the sum of the vapor tensions of each, and when one of high boiling point is condensed into the liquid form it will carry down with it some of the others whose boiling points are such that, if left to themselves, they could be retained in the gas. It is, therefore, necessary to effect the cooling of the gas in such a way that the condensing out of the vapors which it is impossible to retain in the gas shall be accompanied by as small a loss as possible of those vapors which can be retained. The problem is further complicated by the fact that the employment of the best method of achieving this result is apt, with coal gas, to lead to trouble in the distribution system from the saturation of the gas with naphthaline, a heavy vapor which condenses directly to the solid form, unaccompanied by other vapors which condensing, simultaneously into liquids, would dissolve the naphthaline. It is, therefore, necessary to compromise and suffer a small loss in one direction in order to avoid trouble in another. On the whole, however, the best treatment consists in the removal of the tar, formed by the condensation of the heavier vapors, while the gas is still at a temperature of above 100° F., and a subsequent gradual cooling of the gas to atmospheric temperatures, the condensed liquids formed at different temperatures being removed before any great further drop in temperature has taken place.

When the gas has reached atmospheric temperature it is necessary to remove the ammonia which has not been absorbed by the condensation during the cooling of the gas, of the aqueous vapor which it contained when it left the hydraulic main. This removal is effected by the use of water. After the removal of ammonia the gas must be treated for the removal of sulphuretted hydrogen, and the reduction of the amount of other sulphur compounds if this latter amount is excessive. The purifying material commonly used in the United States for the purpose has as its active agent hydrated sesquioxide of iron. This combines with sulphuretted hydrogen to form sulphide of iron, which, upon exposure to the atmosphere, is oxidized with the re-formation of the hydrated ferric oxide and the setting free of sulphur. The efficiency of this portion of the process increases with rise in temperature, and in many gas works the gas is heated to a temperature of about 100° F. at the inlet of the purifiers.

The purifiers complete the chemical and physical treatment of the gas, which leaves them fit for distribution, but for economical reasons it is measured and then passed into storage holders before being sent out.

In the early years of the industry the treatment given the raw material and the resulting volatile products was largely governed by rule-of-thumb, but in recent years all the manufacturing steps have been studied scientifically and great progress has been made both in knowledge as to principles and in the practical application of this knowledge. Much remains still to be investigated, and there is no reason to doubt that the processes now employed will be improved as time goes on, and that the debt of humanity to the gas industry, accumulated during the first century of its existence, will be largely increased during the second.

APPENDIX

	Coal Gas.	Carburetted Water Gas.	Water Gas.	Crude Oil Gas.	Oak Wood Gas.
Candle Power	16.7	24.5	—	19.7	26.0
Specific gravity	0.430	0.625	0.53	0.482	0.580
B. t. u. per cu. ft.					
Observed	—	626.8	316.8	679.9	—
Calculated	659.7	626.7	302.2	—	—
Analysis.					
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent
Illuminants—unfixed. C_6H_6	0.80	0.6	—	7.01	6.46
fixed.... C_nH_m	4.00	11.4	—	7.01	6.46
Carbon monoxide.....CO	8.20	31.3	42.8	9.21	26.11
Hydrogen..... H_2	45.20	36.1	50.3	39.78	30.44
Marsh gas.....CH_4	37.40	12.6	0.4	34.64	33.12
Ethane..... C_2H_6	0.70	2.3	—	—	—
Carbon dioxide.....CO_2	1.60	3.0	3.0	2.62	0.48
Oxygen..... O_2	0.30	0.4	0.4	0.16	—
Nitrogen..... N_2	1.80	2.3	3.1	6.58	3.39
	100.00	100.0	100.0	100.00	100.00

Suggestions on Storing Coal

With full appreciation of the fact that any or all of the following suggested precautions may prove impracticable or unreasonably expensive under certain conditions, they are offered by the Bureau of Mines as advisable for safety in storing bituminous coal:

1. Do not pile over 12 feet deep, nor so that any point in the interior of a pile will be over 10 feet from an air-cooled surface.
2. If possible, store only screened lump coal.
3. Keep out dust as much as possible; to this end reduce handling to a minimum.
4. Pile so that lump and fine are distributed as evenly as possible; not, as is often done, allowing lumps to roll down from the peak and form air passages at the bottom of the pile.
5. Rehandle and screen after two months, if practicable.
6. Do not store near external sources of heat, even though the heat transmitted be moderate.
7. Allow six weeks' "seasoning" after mining and before storing.
8. Avoid alternate wetting and drying.
9. Avoid admission of air to interior of pile through interstices around foreign objects, such as timbers or irregular brickwork, or through porous bottoms, such as coarse cinders.
10. Do not try to ventilate by pipes, or more harm may often be done than good.

[Continued from Page 396.]

PROCEEDINGS OF THE EIGHTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

Held in the Auditorium Hotel, Chicago, March 20 and 21, 1912.

First Day—Morning Session.

The President—Having sufficient time this morning, it might be well to take up another paper, especially in that because at some of the later sessions we may not have the time to pass through all of the papers. Accordingly I introduce to you Mr. W. L. Powers, of Decatur, Ill., who will read his paper on

CO-OPERATION.

In this day of consolidation of gas and electric properties, most of us in the gas business have been obliged to stand by and read the sign "Hands Off," in the lighting field, and have, of necessity, looked up new fields for business. In our efforts to keep our sendout increasing under the handicap of a loss in the lighting field, we have turned to the fuel appliances, space heating, industrial appliances, hotel and restaurant installations, and especially the water heater, which will, in a few years, be running neck and neck with our old friend, the gas range, as a revenue producer. Now, what have we done in the water heater field? We have started out with the old "Gas range at cost" idea, and what have been the results? We have, in almost every instance, made our own gas and water connections, and sold a cheap heater at cost, with the following results:

First.—Our territory was flooded with cheap, inefficient heaters, which necessarily meant high cost of operation and dissatisfied consumers; second, Mr. Master Plumber, who has been installing coal heaters, discovers that he is losing some business, and goes into the gas water heater business also; but what does he find? He finds that he must buy the cheapest heater he can, in order to compete with the gas company, resulting in more inefficient heaters and more dissatisfied consumers. The plumber soon finds that his heater customers begin to drop in every few days to find fault with the operation of his heater, and, after the plumber makes a few trips to satisfy his customer, and has eaten up his profit by lost time, he begins to intimate that a gas water heater is an impractical and expensive appliance for heating water. If anyone of you will take yourself out of the gas business, and put yourself in the position of the average consumer, you will agree with me in the statement that the plumber's relation to the average consumer on questions of sanitation or water heating (water heating problems, etc.) is the same as the physician to the sick man or the jeweler to the broken watch. When your water heater prospect, who has told your solicitor, "I will think it over and let you know later," meets his plumber or drops in to see him on business, he incidentally mentions the gas water heater; and what are the results? Mr. Plumber with shop rent, gas bills, heat and other overhead expenses to pay remembers his former experience. He knows that the gas company will install the gas water heater. With visions of his profit on the sale and installation of a coal heater, he very promptly gets busy, and very thoroughly discourages your prospect, who, as in a majority of cases, already has the feeling of distrust, which is too often held against a public service corporation. This is not merely a pen picture on my part, but is the result of close observation and personal talks with plumbers for the past few years.

On January 23 and 24 of this year the Master Plumber Association of Illinois met in convention at Decatur, in which city I live and was in charge of the gas business for 4 years. As I call on and do business with plumbers in 8 cities in Illinois, Decatur being one of them, our Company decided to make quite an extensive display of water heaters; in fact, we displayed a type of gas water heater to cover any condition that might arise in the water-heater field. Our office, being on the ground floor of the building in which the Convention was held, and an invitation having been extended to the delegates to attend the water-heater exhibit, we had plumbers from nearly all cities and towns in Illinois. The expression of the plumbers was generally one of opposition to the gas company. This expression, together with the fact that we are getting along nicely with the plumbers on a co operative plan, led me to attempt this paper and explain our plan. In the first place, we do not connect any heaters at all, giving all the work and profits to the plumbers. We carry the heaters in stock, and when a plumber sells and installs a heater he sends to our office and gets his heater from our stock; this enables him to always have a stock of heaters on hand and still not have any money invested. Now, the question is asked, what advantage does the gas company derive? Why not let the plumber carry a stock of heaters? The plumber makes all the profit. One advantage is that we are enabled to standardize on a heater that we know is of high efficiency, and one with which we can insure the plumber against his old-time complaint, "maintenance cost." We furnish each plumber a sample tank heater for display, and also furnish gas for demonstrating. The plumber furnishes the range boiler and connects the heater in a conspicuous place on his show-room floor; this not only displays the gas heater, but the fact that a plumber shows a gas water heater on his floor is his recommendation that a gas water heater is a practical and economical appliance for heating water. When we sell a heater we ascertain who is the regular plumber employed by the customer, and if he expresses a preference we give that plumber the job; in this way we do not put one plumber on another plumber's job. If no preference is expressed we start at the head of the list of plumbers and give each one a job in his turn; we also meet the journeymen plumbers as often as we can, either as individuals or as a body, and talk about heaters, explaining the complaints we have from water heaters and the remedies for them. We keep before the plumber the fact that he benefits by the installation of every gas water heater, emphasizing the fact that most gas water heaters are installed where coal heaters are already connected, and only because of "The Modern" gas water heater is it possible for him to secure more work. This means that every journeyman plumber becomes a solicitor for the gas company. Most coal heaters of to-day are being made as combination water heater and laundry stove; this is one of the convincing arguments in their favor. The gas laundry stove is also benefited by the gas water heater, and we sell the plumber a sample laundry stove for his showroom at cost, and protect him with a price, which gives him a profit on every sale he makes. We also carry the plumber's stock of laundry stoves. In several of the cities where we are operating gas plants the plumbers co operate with us to the extent of buying sample automatic heaters for their showrooms, and furnish us with a list of prospects explaining the general conditions of each plumbing job with which they are in position to be familiar, and allow us to use their names in soliciting business. I want to say that we sell by this co-operation a great many heaters that we could not sell in any other way.

Did you ever investigate and keep a record of the number of gas water heaters the plumbers have kept out of use in your city by their suggestions to architects and property owners? If you have not, try it. We make regular calls on all architects and discuss the water heater conditions with them. We have several gas water heaters in the homes of architects and plumbers, which we install at the special prices which all water heater manufacturers make for that class of trade. It want to cite one instance I recall of calling on an architect who said, "Why, I cannot conscientiously recommend your heaters to my clients, as I have a gas heater in my house that is a source of continual trouble to us.." I investigated and found, as I expected, a cheap, inefficient heater, which I promptly replaced at our expense, and this architect has since sold several heaters for us.

I believe we have as many automatic heaters installed in Decatur as in any other city of its size, and a great many of them were sold by plumbers. We have in operation on our appliance room floor a line of heaters which we invite the plumbers to use for demonstrating to their customers. Our solicitors are at the service of the plumbers in closing up their prospects or looking up information for them.

I want to say in conclusion that one of the most important points in water heater work is to be sure and study the conditions surrounding each water heater installation, and be sure to recommend the right type of heater; and, above all, protect your plumber with your experience and knowledge, always remembering that as a gas man, you are in better position than he is to make rates and to know that your heater will operate satisfactorily under the existing conditions.

Discussion.

The President—This is a very live commercial topic, with which I think many of the gas men in the smaller cities have had considerable experience. Mr. Negley, could you give us something along that line?

Mr. Negley—I don't believe I can much enlighten the members on this subject, but am heartily in favor of the plan outlined by Mr. Powers. We should co-operate with the plumbers and contractors and architects. There certainly is room for improvement in all of our towns, and I believe some plan along the one suggested is the

proper one to pursue. In our town we have not had the success in selling heaters that is reported from the larger cities. However, we endeavor to keep a line of heaters on the floor, and sell the goods to plumbers at cost, who can come to our office and get what they wish at any time. We make free gas connections, and try to handle as good a heater as there is on the market, which I think is one way in handling business that keeps down trouble.

The President—Mr. Parker, have you had that experience?

Mr. Parker—Having just taken up that question, it appears from the feeling shown that it will work out satisfactorily. Up to now it has been a rather unsatisfactory proposition to us. We have had a good deal of trouble, but we believe, with an improved, up-to-date heater we can cause a different feeling among the plumbers, and that we are going to see a wonderful improvement in our water heater business.

The President—Will Mr. Channon tell us something of his experience?

Mr. Channon—We have started this spring to carry a stock of heaters with the idea of carrying out some of the ideas outlined by Mr. Powers, and find that the smaller plumbers are very willing to act with us. The larger ones rather think they can get an advantage over the smaller plumbers by buying in large quantities, and so do not take kindly to the plan of buying from a central concern. I believe it is a step in the right direction and that it will work out in first class shape.

The President—If there is nothing further, will Mr. Powers close the discussion?

Mr. Powers—I might say at this time there is considerable discussion as to the advisiability of plumbers co-operating with gas companies, and the feeling was generally pretty bitter against the gas companies throughout the State. The fact that we were getting along so well led to considerable discussion in the meeting of Master Plumbers. They sent letters to us from three of our towns, and I want to say that 2 or 3 years ago the feeling in our town was very much the same as they express it in other places at the present time. If it is of any interest, I would be glad to read 2 or 3 letters showing the feeling of the Master Plumbers' Association in those towns.

The President—It would be interesting to hear expressions representing their side of the case.

Mr. Powers—Here is a letter from the Master Plumbers of Decatur:

DECATUR, ILLS., Feb. 1, 1912.

MR. W. L. POWERS, Industrial Gas Engineer, Illinois Traction System, Decatur, Ills. Dear Sir: We wish to express to you our appreciation for your kind efforts in doing what you did to help make our convention a success, and also for getting together the fine display of water heaters you had on your showroom floor, which indeed covered everything in the water heater line.

A great deal of surprise was expressed by Master Plumbers from different cities of the State at the co-operation existing between the Master Plumbers at Decatur and the local Gas Company, and we were called upon a good many times to explain the plan of this co-operation, which we were very glad to do.

We are also glad to say that, through your personal efforts in bringing about the harmony which now exists, more gas water heaters were sold in Decatur in the past 1½ years than had been sold in several years previous. Very truly yours,

T. E. DOWNING, President Decatur M. P. A.

We have this from Champaign, one of the towns we have had a very hard fight in for a number of years on the water heater proposition:

CHAMPAIGN, ILLS., March 19, 1912.

MR. W. L. POWERS, Industrial Gas Engineer, Illinois Traction System, Decatur, Ills: It may interest you to know that those of our organization who have been co-operating with your Company in the sale of the Ruud automatic storage system are well pleased with the results which we have had in sales. As you will remember, three of the plumbing firms in our city placed the automatic storage system on display in our showroom, and the result has been that an interest has been awakened in our city in this type of water heater, eventually resulting in several sales for each one of us.

The feature that interests me most in regard to this question is the fact that it proves to me co-operation pays. We hear a great deal in these days about competition, and a fair competition is surely a help to trade; although I have never been able to swallow the whole quotation, that it is "The life of trade." I believe a fair co-operation will do more than what is sometimes considered competition—*i. e.*, each fellow trying to underbid and outdo the other in getting business. The fact that the gas company has co operated with the plumbers in the sale of this system has given the plumber confidence to push the sale of these outfits. Under the old scheme there was not a plumber in our town who would waste a moment of his time talking gas heaters, because the majority of our citizens thought they could do a little better in the way of price by dealing with the gas company. Now that the gas company has referred all inquiries to the plumbers, the plumber is in turn stocking gas heaters; keeping literature to advertise it in prominent places in their show rooms; boosting it all they can; and the writer feels safe in saying that you will not find one master plumber who has entered into this co operation that is not satisfied with the results. We are interested in your plan and trust that, for the benefit of our craft, you will be successful in securing the adoption of this scheme in other cities of our State.

Very truly yours, A. W. SEVERNS, Secretary, C. & U. M. P. A.

Another town in which we had a hard fight with the plumbers is Danville. Mr. Straw, President of the Master Plumbers' Association of Danville, writes:

DANVILLE, ILLS., March 15, 1912.

MR. W. L. POWERS, Manager of Gas Plants, Ills. T. S. Dear Sir: It gives me great pleasure to voice the sentiments of my associates in the plumbing business in this city, in that your system of co-operation between the gas company and the master plumbers, for the promotion of selling and the installation of gas water heaters, is working very satisfactorily, from a business and financial standpoint. I set and connected more gas water heaters in the last 10 months than I did in 5 years previous, and that my competitors have had equal amount of business. Wishing you success, L. W. STRAW, President, M.P.A.

Last week I was in Danville, and stopped in this gentleman's shop. A little partition divided off his brass room from the main office, I was not in there eavesdropping or anything, but I could not help overhearing a conversation that was being carried on between Mr. Straw and a customer just as I came in. This customer was complaining of a small heater which he wanted moved into the basement and asked him to disconnect the gas heater entirely and throw it out. He had got just as much work out of him as he could anyway, he had sold him a coal heater, and yet Mr. Straw talked this gentleman into also getting a gas tank heater and having it connected up. We ran across a number of instances of that kind. For instance: The other day a plumber took back a coal heater that he had sold and sold a gas heater on the job, allowing the woman nearly as much as she had paid for her coal heater. I attended a meeting in Decatur last night of the Journeymen Plumbers' Union. We work with them as much as we can, and while I was at that meeting three different plumbers in that organization, their local union of plumbers, cited me to three persons for water heaters, in which they said they had gone as far as they could on the water heater proposition, saying: "If you can go out there and talk to them, I think you can land the job." That is the feeling we are having throughout the town, which demonstrates what we can do. During the last State meeting we had some photographs taken of them, and I put one up out here in the anteroom showing the group picture of the Master Plumbers' Association of Illinois. My idea was that you might see the body of men you are trying to co-operate with. They are a very intelligent looking body.

Mr. Gravely—My experience with plumbers has been that when we sell them hot water heaters, and install them, that something goes wrong. If there is any trouble with them they start to "knock." They may have a little trouble with the gas stove; they do not know what it is, but they knock the water heater, and I believe I have the plumbers so aroused, if they get into trouble they let me know. When the plumbers realize that we are doing all this work gratuitously, I think we will have their support.

On motion an adjournment was ordered to 2 P.M.

FIRST DAY—AFTERNOON SESSION.

The Association reassembled at 2 P.M., and the President introduced Mr. C. A. Luther (Chicago), who read a paper descriptive of the

ILLUMINATION OF PEOPLE'S GAS BUILDING, CHICAGO.

[In that an exhaustive, especially prepared article on the same subject appeared in the JOURNAL, dated May 8th, 1911, the author being Mr. Luther, we will pass publication of the subject as presented at the meeting of the Illinois Association. It is altogether appropriate, however, to say that the Association's paper went more largely into detail than did the special to the JOURNAL, for the Chicago presentation was tellingly illustrated by a number of lantern slides and a multitude of engravings.]

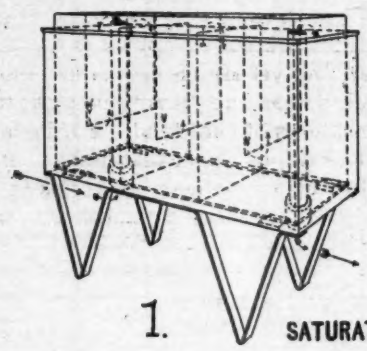
The President, on the conclusion of the reading of the paper, said he was sure all would agree that the Luther chapters formed as interesting a paper as had been presented to the Association. They must realize that Mr. Luther had given it much careful attention, and he believed they all appreciated its value. As it is not a paper that could bring out much discussion, Mr. Luther should consider himself heartily thanked for the interesting and valuable relation he had made to to them. [Applause.]

The President introduced Mr. C. C. Schiller, of Chicago, who presented the following facts respecting

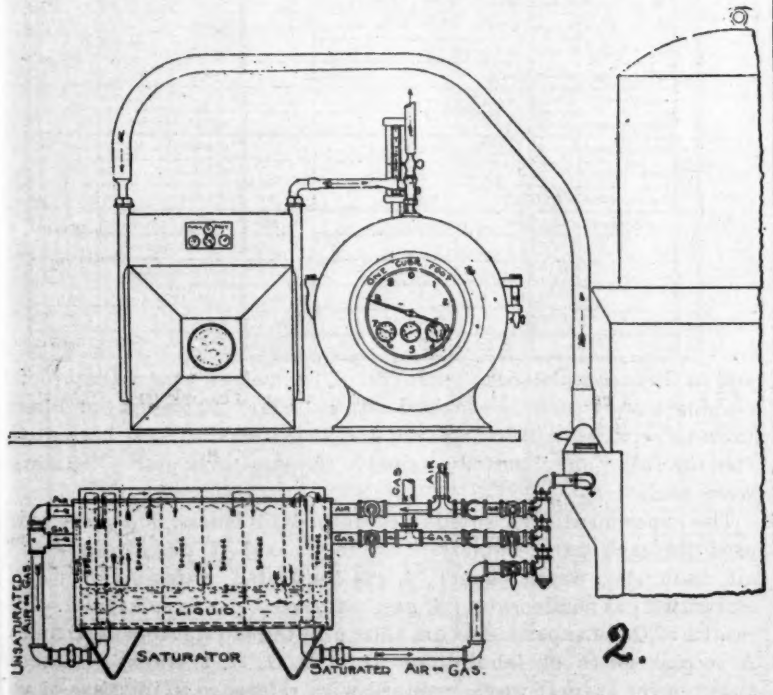
VOLUMETRIC CHANGES THAT OCCUR IN MEASURING FLUID IN THE TRANSITION OF SAME AT TIME OF TEST THROUGH GAS METERS THAT HAVE BEEN IN SERVICE.

In testing with air meters that have been on gas the fact that a noticeable increase in the volume of the measuring fluid (air) takes place during its passage through the meter tested has been shown by those who have studied the subject of meter testing. But to what extent this was a factor in accurate meter testing has not been determined or fully discussed. There are other factors that affect the accuracy of meter testing, but in what follows we have confined ourselves solely to the observations of the change in volume that takes place during the transition of the measuring fluid through meter being tested, independent of and notwithstanding temperature conditions are stationary and regarded as correct. The noticeable change has been explained as due to the volatile oils present more or less in all meters. The volatile oils vaporize in the presence of gas or air, to what extent depending upon the degree of saturation of the latter, and also upon the temperatures prevailing.

As a preliminary to the study of this matter it was decided to reproduce the usual testing conditions and vary this by the substitution of either air or gas that had been passed through a device designed to add either water vapor or gas vapor to as near saturation as could be obtained. This saturator (see Figs 1 and 2 was constructed so as



1. SATURATOR.



2.

to cause the measuring fluid to pass through sponges partly immersed in the liquid to be vaporized just before being drawn into the prover used to make the tests. Tests were made in which water had been used as the saturating medium, and similar tests were being made using condensate collected from meters that had been removed from service.

The tests were made to conform to the usual practice of testing meters, and temperature conditions had were fairly uniform, the temperature prevailing during these tests being within the range of 5°, and 70° F. prevailed throughout the greater part of the time. Meters were tested at a rate equivalent to 30 cubic feet per hour, being directly connected to prover in the customary manner (see

A

UNSATURATED.

1. AIR.						2. GAS.					
NEW OR REPD = 5 YRS.	DIPPING		AGE.			NEW OR REPD = 5 YRS.	DIPPING		AGE.		
METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS
MD-B 28100 C-9-08	0.50 0.75	96½ 96	MD-B 542890 N-10-11	-0.00 0.50	99½ 99½	J. J. G. 334431	1.63 1.13	96 97	MD-B 31160 N-2-07	0.75 0.36	103 99	MD-B 34413 G-5-11	0.13 0.00	103 103½	MD. 476239	-0.25 -0.25	101 101½
MD-B 199546 N-12-08	0.00 0.25	99½ 96½	MD-B 489669 N-5-11	0.38 0.50	102 100	MD. 526181	0.38 0.13	101 100½	MD-B 48490 G-7-08	0.00 0.00	100½ 100½	MD-B 342769 N-9-10	0.63 1.25	103½ 101½	Am. 229739	-0.25 -0.25	101 101
MD-B 144415 N-9-08	0.50 0.50	99 98½	MD-B 104231 E-9-11	1.25 1.00	99½ 99½	Am. 604065	1.75 1.25	99 98	MD-B 48303 G-7-08	0.38 0.13	100 100½	MD-B 444787 N-1-11	0.25 0.25	101½ 101	J J G 380631	-0.28 -0.38	100 99½
MD-B 191044 N-11-08	0.38 0.13	98½ 96	MD-B 399291 N-9-10	0.50 0.25	100 99½	J J G 418416	1.88 1.00	97 99	MD-B 141220 N-4-08	-0.13	100½	MD-B 476674 N-4-11	-0.13 -0.13	103½ 102½	Am. 483060	-0.50 -0.38	100 100
MD-B 26437 N-3-07	0.75 0.50	103 100½	MD-B 363730 N-4-10	0.88 0.88	99 98½	Number Lost 817237	1.25 1.25	98 96	MD-B 35600 E-1-10	0.13 0.13	101½ 100½	MD-B 224138 E-10-10	0.00 0.00	101½ 101½	Mc O 255117	-0.25 -0.25	101 101
MD-B 145779 N-5-08	0.00 0.50	98 97	MD-B 447013 N-12-11	1.25 1.13	102 100½	MD. 348334	0.50 0.50	101 100	MD-B 16893 G-9-08	0.00 0.00	100 100	MD-B 476680 N-4-11	0.25 0.25	100½ 101	MD. 397166	-0.25 0.00	100½ 99½
MD-B 23437 N-1-07	0.75 1.00	103½ 102	MD-B 528672 N-8-11	1.38 1.13	100½ 100½	MD. 342895	0.75 0.80	99½ 98	MD-B 17742 N-12-08	0.00 0.13	100½ 100	MD-B 389572 N-8-10	0.25 0.75	101 102	Gasometer 71280	-0.13 0.00	100½ 100½
MD-B 29456 N-5-07	1.00 0.75	102 101	MD-B 534724 N-8-11	1.00 0.75	101 100½	MD 546019	1.00 0.75	100 100	MD-B 143764 N-5-08	0.00 0.13	100½ 100	MD-A 186279 G-7-10	0.00 0.25	100½ 100½	Gasporm 194933	0.00 -0.25	100½ 100½
MD-B 20409 N-1-07	0.50 0.50	98 97	MD-A 43219 G-9-11	1.00 0.75	100½ 100½	MD 790173	1.25 1.00	100 99	MD-B 173916 N-9-08	0.25 0.25	102 102	MD-B 471541 N-4-11	0.25 0.25	103 103½	Am. 783907	-0.25 -0.38	102 102
						MD. 534751	1.25 1.25	98 98	MD-B 213228 P-6-04	0.88 0.75	100½ 100½						
AVERAGE	0.88%		AVE.	0.85%		AVE.	1.16%		AVE.	0.20%		AVE.	0.17%		AVE.	-0.25%	
AVERAGE	0.54%		AVE.	0.71%		AVE.	0.88%		AVE.	0.21%		AVE.	0.30%		AVE.	-0.24%	
MEAN DIFFERENCE	1.00%		MEAN DIFF.	1.38%		MEAN DIFF.	1.88%		MEAN DIFF.	0.88%		MEAN DIFF.	0.43%		MEAN DIFF.	-0.50%	
MEAN DIFFERENCE	1.00%		MEAN DIFF.	1.13%		MEAN DIFF.	1.25%		MEAN DIFF.	0.75%		MEAN DIFF.	0.75%		MEAN DIFF.	-0.38%	

B.

SATURATED - WATER VAPOR.

3. AIR.						4. GAS.					
NEW OR REPD = 5 YRS.	DIPPING		AGE			NEW OR REPD = 5 YRS.	DIPPING		AGE		
METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS
MD-B 116163 N-4-08	1.00 0.75	100½ 99½	MD-B 523446 N-7-11	1.13 1.00	100½ 100½	MD-B 747544	1.00 0.75	99 99	MD-B 84260 N-1-07	0.50 0.63	98 96½	MD-B 220964 N-3-09	0.50 0.63	99½ 99	MD 543586	0.38 0.38	99½ 99
MD-B 113555 N-3-08	0.75 0.50	99½ 99	MD-B 194602 G-7-10	1.75 1.38	100½ 100	MC D 198433	1.00 0.75	100 99½	MD-B 24646 G-2-09	0.75 0.50	98½ 98½	MD-B 54801 P-8-11	0.25 0.13	102½ 102½	MD 569667	0.25 0.63	97½ 97½
MD-B 37988 G-3-09	1.00 0.88	100½ 100½	MD-B 24261 P-7-11	1.25 1.25	100½ 100½	MC D 346941	1.50 1.00	97½ 97	MD-B 274043 N-8-09	0.13 0.38	99 98½	MD-B 486137 N-5-11	-0.25 -0.13	102 102	MD 687880	0.25 0.13	97½ 96½
MD-B 36217 N-2-07	0.88 0.75	97½ 97	MD-B 385637 N-8-10	1.63 1.38	99 99	MC D 238527	1.00 0.75	97½ 97½	MD-B 317534 N-1-10	0.25 0.25	99 99	MD-B 28201 P-5-10	0.25 0.25	100½ 100½	MD 748364	0.50 0.50	97½ 96½
MD-B 28571 G-8-08	2.00 1.88	100½ 97½	MD-B 527764 N-8-11	1.00 1.00	100½ 100½	MD 691243	0.50 0.25	96 95½	MD-B 294779 N-10-09	0.13 0.00	101 100	MD-B 40830 P-6-10	0.50 0.25	100½ 99½	MD 565125	0.25 0.25	96½ 96
MD-B 40535 G-11-08	1.25 1.13	100 99	MD-B 444899 N-1-11	1.13 1.13	100½ 100½	MD. 610576	0.88	100½	MD-B 309331 N-11-09	0.25 0.25	99 98½	MD-B 444862 N-1-11	0.38 0.50	100½ 100½	MD 701038	0.25 0.38	93 92½
MD-B 123697 N-4-08	1.13 0.75	100½ 100	MD-B 467927 N-3-11	1.88 1.00	100½ 100½	MD 680369	1.50 1.38	99½ 99½	MD-B 145724 N-5-08	0.25 0.25	98½ 98½	MD-B 527425 N-8-11	0.25 0.00	102 101½	MD 414039	0.75 0.63	97 96½
MD-B 206901 N-2-09	0.50 0.38	100½ 100	MD-B 40887 G-5-10	1.00 0.63	101 100½	MD 466104	1.00 0.50	101 100½	MD-B 31911 N-1-10	0.38 0.25	100½ 100½	MD-B 426374 N-11-10	0.63 0.38	100½ 100½			
MD-B 15069 N-12-06	1.00 0.88	101 100½	MD-B 538593 N-9-11	0.75 0.75	100½ 100½	MD 789012	1.13 0.88	99 99½	MD-B 44274 G-2-09	0.38 0.25	99½ 99½	MD-B 476865	0.13 0.25	102½ 102½			
MD-B 33067 G-9-08	1.00 0.88	99½ 99½	MD-B 523382 N-7-11	1.63 1.50	100 100½				MD-B 115892 N-4-08	0.50 0.38	102 100½						
AVERAGE	1.05%		AVE.	1.25%		AVE.	1.06%		AVE.	0.36%		AVE.	0.29%		AVE.	0.41%	
AVERAGE	0.88%		AVE.	1.10%		AVE.	0.78%		AVE.	0.31%		AVE.	0.25%		AVE.	0.41%	
MEAN DIFFERENCE	2.0%		MEAN DIFF.	1.75%		MEAN DIFF.	1.60%		MEAN DIFF.	0.75%		MEAN DIFF.	0.63%		MEAN DIFF.	0.75%	
MEAN DIFFERENCE	1.88%		MEAN DIFF.	1.50%		MEAN DIFF.	1.38%		MEAN DIFF.	0.63%		MEAN DIFF.	0.63%		MEAN DIFF.	0.63%	

C

SATURATED - CONDENSATE

5. AIR.						6. GAS.					
NEW OR REPD = 5 YRS.	DIPPING		AGE.			NEW OR REPD = 5 YRS.	DIPPING		AGE.		
METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS	METER	PERCENT CHANGE IN VOLUME	TEST OF DRY GAS
MD-B 23446 N-1-07	0.13 0.00	102 102	MD-B 17348 G-9-11	0.00 0.00	100½ 100½	MD 642947	0.13 0.25	96 99	MD-B 280476 N-9-09	0.38 0.25	98½ 101	MD-B 549380 N-10-11	0.13 0.00	100½ 100½	MD 751403	0.25 0.25	96½ 96½
MD-B 30927 N-2-07	0.25 0.13	103 102½	MD-B 473387 N-4-11	0.00 0.00	100½ 100½	MD 711520	0.63 0.75	97½ 97½	MD-B 143688 N-5-08	0.38 0.38	100 100	MD-B 443899 N-1-11	0.13 0.00	100½ 100	MD 742480	0.00 0.00	98 98½
MD-B 149814 P-2-08	0.63 0.50	100½ 100	MD-B 20505 G-6-09	2.75 0.63	99½ 99½	MD 456244	0.50 0.38	100 100	MD-B 28278 N-2-07	0.38 0.25	102 101	MD-B 421039 N-3-11	0.00 0.13	101½ 101½	MD 468029	0.13 0.00	99 99
MD-B 40145 N-3-07	0.63 0.50	99½ 99½	MD-B 444908 N-1-11	0.50 0.38	102 102	MD 592717	0.25 0.25	96 96½	MD-B 224489 N-4-09	0.00 0.00	98 98½	MD-B 24906 G-4-11	-0.13 -0.25	100 102½	MD 855317	0.00 0.03	98 98
MD-B 20196 N-1-07	0.25 0.25	100½ 100½	MD-B 194375 G-5-10	1.13 1.00	99 99	MD 682624	0.88 0.75	98½ 98½	MD-B 285923 N-9-09	-0.13 -0.50	100½ 100½	MD-B 16913 G-8-11	-0.38 -0.25	99½ 99½	MD 542752	0.13 —	101 —
MD-B 146144 N-6-08	0.88 0.75	102 102	MD-B 536554 N-9-11	0.50 0.38	100½ 100½	MC D 534760	0.50 0.38	97 96½	MD-B 20268 N-12-08	0.00 0.13	100 100	MD-B 453933 N-2-11	0.13 0.00	100½ 100	MD 742837	0.25 0.25	97½ 97
MD-B 30920 N-2-07	0.63 0.63	101 100½	MD-B 463757 N-3-11	0.88 0.38	100½ 100½	J. J. G 454188	0.63 0.50	101 100	MD-B 127549 G-9-09	0.63 0.38	99½ 99½	MD-B 483474 N-5-11	0.38 0.38	101½ 101½	MD 694842	0.25 0.13	98 98
MD-B 170428 N-8-08	0.50 0.63	101½ 100½	MD-B 444736 N-1-11	1.00 1.00	101 101	MD 684942	0.50 0.50	98½ 98½	MD-B 320257 N-2-10	0.38 0.38	99½ 99½	MD-B 553165 N-10-11	0.00 -0.13	100 100½	MD 425365	0.13 0.00	99½ 99½
MD-B 272309 N-8-09	0.37 0.25	101 100½	MD-B 441434 N-1-11	0.63 0.38	101 100	MD 710205	0.63 0.63	97½ 96½	MD-B 10436 G-6-08	0.00 0.13	99 98½	MD-B 443904 N-1-11	0.00 0.00	99½ 99½	MD 548087	0.25 0.13	102 102
MD-B 324264 N-2-10	0.75 0.63	100½ 100½	MD-B 434386 N-1-11	0.50 0.50	101 102	MD 699773	0.25 0.38	101½ 102	MD-B 228250 N-9-09	0.25 0.13	98 97½	MD-B 389913 N-8-10	0.00 0.00	100 99½			
AVERAGE	0.50		AVE.	0.53		AVE.	0.49		AVE.	0.23		AVE.	0.03		AVE.	0.15	
AVERAGE	0.43		AVE.	0.46		AVE.	0.48		AVE.	0.15		AVE.	-0.01		AVE.	0.10	
MEAN DIFFERENCE	0.88		MEAN DIFF.	1.13		MEAN DIFF.	0.88		MEAN DIFF.	0.63		MEAN DIFF.	0.38		MEAN DIFF.	0.25	
MEAN DIFFERENCE	0.75		MEAN DIFF.	1.00		MEAN DIFF.	0.75		MEAN DIFF.	-0.50		MEAN DIFF.	0.38		MEAN DIFF.	0.26	

Fig. 2). In testing meters it is usual to start the test with the index hand on one of the divisions of the tally dial. In these tests only enough of the measuring fluid was allowed to enter the meter to accomplish this purpose prior to making test. In order to determine what change in volume took place during the transition of the measuring fluid through meter under observation, an ordinary 3-compartment, 3-revolution per cubic foot wet meter was used. This wet meter was adjusted for each experiment with the same kind of measuring fluid used throughout that experiment, and was frequently checked. (See Fig. 2.)

For comparative purposes it was decided that an equal number of meters be used for each test, and that these meters be selected from some that had just been removed from the customers' premises in the ordinary run of work. To further uniform conditions, and perhaps

D. 1. UNSATURATED AIR.

	METER			INCREASE IN VOLUME. 0%-½%	½%-1%	1%-	DECREASE IN VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN FASTER 0%-½%	½%-	SLOWER ½%-
A.	MD-B	28100	G-9-08	0.5				0.5		
	MD-B	190546	N-12-08	0.0				0.5		
	MD-B	149495	N-6-08	0.5				0.5		
	MD-B	191044	N-11-08	0.38				0.5		
	MD-B	145771	N-5-08	0.0					1.0	
	MD-B	20409	N-1-07	0.5					1.0	
	MD.	526181		0.37						0.5
	MD.	748334		0.5					1.0	
	MD-B	542850	N-10-11	0.0				0.0		
	MD-B	489669	N-5-11	0.37				0.5		
	MD-B	388281	N-8-10	0.5				0.5		
	MD-B	353730	N-4-10	0.0						
B.	MD-B	40437	N-3-07		0.75			0.5		
	MD-B	23657	N-1-07		0.75				1.5	
	MD	742815			0.75				1.5	
	MD-B	353730	N-4-10		0.87				1.25	
C.	MD-B	59456	N-5-07			1.0			1.0	
	J.J.G.	334491				1.62				1.0
	Am.	504065				1.75			3.0	
	J.J.G.	415416				1.87			3.0	
	HARRIS BROS	317257				1.25			2.0	
	MD	546019				1.0		0.0		
	MD	750173				1.25			1.0	
	MD	594751				1.25			1.0	
	MD-B	109251	E-6-11			1.25		0.0		
	MD-B	447013	N-2-11			1.25		0.5		
	MD-B	528672	N-8-11			1.37		0.0		
	MD-B	534754	N-8-11			1.0		0.25		
	MD-A	43219				1.0		0.5		
				12	4	13		14	12	2

E. 2. UNSATURATED GAS.

	METER.			INCREASE IN VOLUME. 0%-½%	½%-1%	1%-	DECREASE IN VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN FASTER 0%-½%	½%-	SLOWER ½%-
A.	MD-B	34413	G-8-11	0.13						0.5
	MD-B	444789	N-1-11	0.25				0.25		
	MD-B	229136	E-10-10	0.0				0.0		
	MD-B	476580	N-4-11	0.25				0.25		
	MD-B	389572	N-8-10	0.25						1.0
	MD-A	186279	G-7-10	0.0				0.25		
	MD-B	471591	N-4-11	0.25				0.25		
	MD-B	48480	G-7-08	0.0					1.0	
	MD-B	35600	G-1-10	0.13				0.50		
	MD-B	16863	G-8-08	0.0				0.0		
	MD-B	17742	N-12-08	0.0				0.50		
	MD-B	143764	N-5-08	0.0				0.0		
	MD-B	173916	N-9-08	0.25				0.0		
	Good	184833		0.0				0.25		
B.	MD-B	392789	N-9-10		0.63				1.0	
	MD-B	31160	N-2-07		0.75				1.25	
	MD-B	213226	P-6-08		0.88					0.50
D.	MD-B	476574	N-4-11				0.12	0.0		
	MD-B	48303	G-7-08				0.25			0.75
	MD-B	141220	N-4-08				0.12			
	MD	676238					0.25		3.50	
	Am.	229728					0.25	0.0		
	J.J.G.	380631					0.38		0.75	
	Am.	483066					0.50	0.0		
	M[illegible] D	255117					0.25	0.50		
	MD	597166					0.25	0.0		
	Good	71280					0.12			2.0
	Am	783607					0.25	0.25		
				14	3		11	17	5	5

F. 3. SATURATED AIR. (WATER VAPOR)

	METER.			INCREASE IN VOLUME. 0%-½%	½%-1%	1%-	DECREASE IN VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN FASTER 0%-½%	½%-	SLOWER ½%-
A.	MD	691243		0.50				0.50		
	MD-B	206901	N-2-09	0.50					1.00	
B.	MD-B	527794	N-8-11		1.00			0.50		
	MD-B	40287	G-5-11		1.00			0.25		
	MD-B	338593	N-9-11		0.75				1.00	
	MD	747544			1.00			0.00		
	M[illegible] D	198433			1.00				1.50	
	M[illegible] D	238527			1.00			0.25		
	MD	610576			0.88					
	MD	466104			1.00					0.25
	MD-B	116163	N-4-08		1.00			0.50		
	MD-B	113555	N-3-08		0.75			0.50		
	MD-B	379760	G-3-09		1.00					1.00
	MD-B	36217	N-2-07		0.88				0.75	
	MD-B	15069	N-12-06		1.00			0.50		
	MD-B	55067	G-3-09		1.00					0.50
C.	MD-B	623446	N-7-11			1.13		0.0		
	MD-B	194602	G-7-10			1.75		0.50		
	MD-B	24261	P-7-11			1.25		0.50		
	MD-B	389637	N-8-10			1.63		0.00		
	MD-B	444899	N-1-11			1.13		0.0		
	MD-B	467927	N-3-11			1.25		0.0		
	MD-B	523382	N-7-11			1.63				0.25
	M[illegible] D	396941				1.50		0.50		
	MD	680369				1.50				1.25
	MD	739012				1.13			0.75	
	MD-B	28571	G-6-08			2.00			0.75	
	MD-B	40535	G-11-08			1.25			1.00	
	MD-B	123697	N-4-08			1.13				1.25
				2	14	13		15	7	6

G. 4. SATURATED GAS (WATER VAPOR)

	METER.			INCREASE IN VOLUME. 0%-½%	½%-1%	1%-	DECREASE IN VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN FASTER 0%-½%	1½%-	SLOWER ½%-
A.	MD-B	220964	E-12-10	0.50					0.75	
	MD-B	54801	P-8-11	0.25				0.25		
	MD-B	28201	P-5-10	0.25				0.25		
	MD-B	40830	P-6-10	0.50						0.25
	MD-B	444862	N-1-11	0.38				0.00		
	MD-B	327425	N-8-11	0.25				0.50		
	MD-B	476865		0.12				0.25		
	MD	548586		0.38				0.50		
	MD	569667		0.50						0.50
	MD	687880		0.25				0.50		
	MD	748344		0.50					1.00	
	MD	565128		0.25				0.50		
	MD	701038		0.25				0.50		
	MD-B	24260	N-1-07	0.50					1.25	
	MD-B	274043	N-8-09	0.12					0.75	
	MD-B	317434	N-1-10	0.25				0.00		
	MD-B	294779	N-10-09	0.12				0.50		
	MD-B	309331	N-11-09	0.25				0.25		
	MD-B	145724	N-5-08	0.25				0.00		
	MD-B	378811	N-1-10	0.38				0.25		
	MD-B	44274	G-2-09	0.38					3.00	
	MD-B	115892	N-4-08	0.50				0.25		
B.	MD-B	426374	N-11-10		0.63			0.25		
	MD	418039			0.75			0.50		
	MD-B	246416	G-2-09		0.75			0.50		
D.	MD-B	426157	N-5-11				0.25	0.00		
				22	3		1	20	5	2

add to their completeness, each lot of 30 meters was made up of 10 dipping meters (new or repaired within 1 year), 10 meters not dipping (new or repaired within 5 years), and 10 meters that have been in service the full "age" period; namely, 10 years. Altogether 180 meters were used.

The experiment was subdivided into 6 divisions, 30 meters being used for each part; namely, 1, air (ordinary); 2, gas (ordinary); 3, air (saturated water vapor); 4, gas (saturated water vapor); 5, air (saturated gas condensate); 6, gas (saturated gas condensate). The results of these experiments are shown in the tabulations A, B and C. A second series of tabulations (D, E, F, G, H, I) shows the meters tested in the several ways, grouped with reference to increase of volume, and also as to change in ordinary accuracy test, as indicated by meter prover.

Fig. 3 is a diagrammatic comparison of the use of either ordinary saturated water vapor, or saturated with condensate vapor, measuring

fluids, these being divided into gas and air, and further subdivided as to class of meters tested. First and second runs are shown separately. It was necessary, because of defects subsequently found in certain meters, to exclude them from the summaries. This accounts for less than 10 meters in some of the groups.

In considering this matter, no attention has been given to the advantage or disadvantage involved in the use of either kind of fluid, in or as far as concerns the meter proving instrument. While closely connected to our subject, we have confined same, as pointed out in the beginning, to the noticeable and apparent change in volume, traceable to the presence of volatile oils in gas meters.

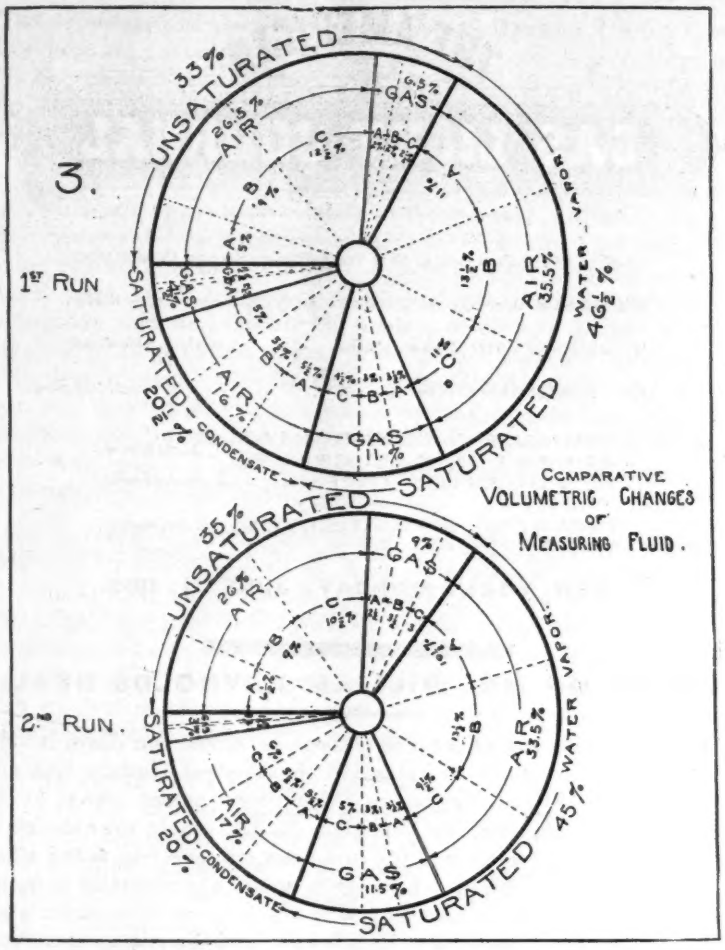
In concluding, Mr. Schiller added: I might point out as a summary that the large per cent. of increase in the volume of unsaturated air was .84 of 1 per cent., while with gas it was only .04. You will also note, having analyzed those figures a little closer, that, while the average increase apparently is higher where the gas condensate is used as a saturator, yet the range of variation was much less, showing unquestionably that gas so saturated is a better testing medium. These figures themselves are, I think, sufficiently marked to be thought worth while by all who are interested, and I want to further add, as emphasizing their value, that another large company, collaborating with us in making this investigation and these experiments, has found much larger variations than we found. Heretofore it has been the practice, almost universally, I think, to use air as a testing medium. Two notable exceptions have been New York and Milwaukee. The explanation offered heretofore has been, in a general way, that they sold gas, and thought, perhaps, for that reason should be the testing medium. In the experiments that we have here I think we have a very substantial reason for the use of gas. The matter, however, is not closed; it is still in process of being investigated, and a more complete report no doubt will eventually be had and perhaps presented before the Institute by the "Consumers' Meter Committee," on behalf of whom these experiments were made.

H 5. SATURATED AIR. (CONDENSATE)

	METER			INCREASE IN VOLUME 0%-½%	½%-1%	1%-	DECREASE IN VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN. FASTER 0%-½%	½%-	SLOWER ½%-
A	MD-B	17348	C-9-11	0.00				0.00		
	MD-B	473587	N-4-11	0.00				0.25		
	MD-B	444988	N-1-11	0.50				0.00		
	MD-B	538534	N-9-11	0.50						1.00
	MD-B	463787	N-3-11	0.25				0.00		
	MD-B	434386	N-1-11	0.50						0.50
	MD-B	23646	N-1-07	0.13				0.00		
	MD-B	30927	N-2-07	0.25				0.50		
	MD-B	20196	N-1-07	0.25				0.00		
	MD-B	170428	N-8-08	0.50				0.25		
	MD-B	272309	N-8-09	0.38				0.50		
	MD.	642947		0.13				0.00		
	MD.	486244		0.50						0.25
	MD.	512717		0.25				0.50		
	MD	534746		0.50				0.50		
	MD	684838		0.50				0.25		
	MD.	611773		0.25				0.00		
B	MD-B	20505	C-6-09		0.75					0.25
	MD-B	441434	N-1-11		0.63				1.00	
	MD-B	149819	P-2-08		0.63			0.50		
	MD-B	40145	N-3-07		0.63			0.25		
	MD-B	146144	N-5-08		0.88			0.00		
	MD-B	30420	N-2-07		0.63					0.50
	MD-B	324264	N-2-10		0.75			0.25		
	MD	711520			0.63			0.00		
	MD	682624			0.88			0.00		
	J.J.G	454186			0.63			0.50		
	MD.	710205			0.63			0.50		
C	MD-B	194375	G-5-10			1.13		0.00		
	MD-B	444734	N-1-11			1.00		0.00		
				17	11	2		24	1	5

I 6. SATURATED GAS (CONDENSATE)

	METER			INCREASE IN VOLUME 0%-½%	½%-1%	1%-	DECREASE VOLUME 0%-1%	DIFFERENCE IN TEST OF 1ST AND 2ND RUN. FASTER 0%-½%	½%-	SLOWER ½%-
A	MD-B	541383	N-10-11	0.13				0.00		
	MD-B	443844	N-1-11	0.13				0.25		
	MD-B	461039	N-3-11	0.00				0.50		
D	MD-B	24404	G-4-11				0.13	0.25		
	MD-B	16413	G-8-11				0.38			1.00
	MD-B	453423	N-2-11	0.13				0.00		
	MD-B	493474	N-5-11	0.38				0.00		
	MD-B	553105	N-10-11	0.00						0.50
A	MD-B	443904	N-1-11	0.00				0.25		
	MD-B	38913	N-8-10	0.00				0.25		
	MD-B	286476	N-9-09	0.38				0.50		
	MD-B	145688	N-5-08	0.38				0.00		
	MD-B	28278	N-2-07	0.38					1.00	
	MD-B	229484	N-9-09	0.00					1.50	
D	MD-B	285523	N-9-09				0.38			0.50
	MD-B	20368	N-12-08	0.00						0.50
	MD-B	320247	N-2-10	0.38				0.25		
	MD-B	19436	G-6-08	0.00				0.25		
	MD-B	288850	N-9-09	0.25				0.50		
A	MD	751603		0.25				0.25		
	MD	742480		0.00				0.25		
	MD	468029		0.13				0.50		
	MD	885317		0.00				0.00		
	M.J.	542752		0.13						
	MD.	742837		0.25				0.50		
	MD.	699842		0.25				0.00		
	MD	425866		0.13				0.25		
	MD	548087		0.25				0.25		
B	MD-B	127549	G-9-09		0.63			0.00		
				25	1		3	22	2	4



Discussion.

The President—Mr. Huddle, will you address us on this subject?

Mr. Huddle—I believe I have nothing further to say in this connection, save we in Wisconsin made tests along the line of determining the accuracy of testing with air, and while I have not the data of the tests with me (they were made some time ago), it will be impossible for me to give the actual results. My recollection, however, is that the differences found were as large or even larger than those shown in this tabulation. The official tests in Wisconsin by the Wisconsin Commission are made with gas. It is not required that gas should be used, and, as I recall, it has not even been suggested, although several companies do use it. As such has been the practice at Milwaukee and Madison for a number of years, some of the smaller plants have followed the practice. Our tests showed that the increase in registration of the meter did not stop until perhaps 4 or 5 tests had been made. Some went from 2 per cent. slow to 3 per cent. fast, as I recall.

The President—Will anyone else speak on this subject?

Mr. Schiller—What Mr. Huddle says, of course, is confirmatory of what our experiments have so far developed. Let me utter the word of caution though, to those who have the testing of meters, that

(*Continued on page* 420.)

THE AMERICAN GAS LIGHT JOURNAL

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

A. M. CALLENDER & CO., - - Proprietors.

THOMAS J. CUNNINGHAM, ELBERT P. CALLENDER, } Editors.
H. THURSTON OWENS, - Associate.

CHARLES H. WADELTON, Manager.

NEW YORK, MONDAY, JUNE 17, 1912.

DEATH OF MR. WILLIAM REYNOLDS BEAL.

With exceeding regret we are obliged to report the death of Mr. William Reynolds Beal, President of the Central Hudson Gas and Electric Company, of Newburgh, N. Y., who passed away, at the country home of his son, Mr. Thaddeus R. Beal, early the evening of June 5th. The suddenness of the summons may well be noted when it is said that the deceased, whose own home was virtually opposite that of his son's, while conversing with the latter on a business matter, raised his hand, sank back in his chair, and the end was reached. Mr. Beal, who was in his 75th year, had been identified with the gas industry since the late sixties, through his ownership with the late Dr. Munn (medical adviser and business confidant of the late Jay Gould), of the Mott Haven (N. Y.) Gas Light Company, which corporation was subsequently re-incorporated as the Central Union Gas Company, and which now is an integral of the properties of the Consolidated Gas Company, of New York. At this time, owing to the lack of certain data important to the story, our account of his useful, estimable life is put over for a week. The funeral services (which were of the strictest family type) were held in "Balmville," Newburgh—the residence of his son, T. R.—the afternoon of the 6th inst.

BRIEFLY TOLD.

A Fish Story.—The illustration and the text depict plainly the prowess of Mr. J. Alexander Mayers, who for the past few months has been busily (when not otherwise) engaged in constructing the new, model gas plant for Key West, Fla. There is no buncombe about this, although it does look a pretty large fish to have been successfully landed by means of an ordinary standard reel and line in the time specified. However, J. A. M., while not in every sense a deacon, is nevertheless a man of probity, and truthful withal. In any event, there is his fish; also, his story.

6/6/12
Dear Tom
I caught
this fish Tarpon
Length 6'-1/2"
weight 100 lbs
in 20 mins
with standard
reel & line.
Its very fine
sport—
Hope you are
well & to see
you early in
July—
Sincerely
J. A. M.

Company Membership in the National Commercial Gas Association.—This, from the June issue of the Bulletin of the named Association, respecting Company membership, seems to show that that idea is meeting general approval. The story as told to date about it is as follows:

In his address before the Denver convention last October, Past-President Stannard made the following statement: "Believing that the time is now ripe for the National Commercial Gas Association to take on additional responsibilities and duties, materially increasing its field of usefulness, greatly broadening its scope of work and becoming of greater value to its members, the appliance manufacturers and the gas industry in general, to this end I take advantage of a paragraph in Article 2 of the By-Laws, which part reads as follows: "At each annual meeting the President shall make such recommendations he may deem advantageous to the Association." Therefore, I recommend that we change our Constitution, sufficiently broadening its scope to permit the accomplishment of the work above suggested, and, that further we should at this time, in my judgment, provide for the creation of Company membership. The revenue to be derived from this new form of membership, together with that of our present source of income, would then place at our command sufficient funds to carry on the work of the Association. I have carefully discussed these recommendations with many of the leading commercial men, engineers, superintendents, general managers and stockholders connected with the gas industry, and it is the unanimous opinion of all that now is the time for us to make these changes, thus enabling the Association to fully meet the requirements of a complete Gas Association in all its various phases and energies. I would further recommend that a committee be appointed to work out in full the necessary details for the fulfilment of the plans proposed, and that they report their recommendations to the next convention." Acting upon this suggestion, the Constitution and By-Laws were changed at that time by unanimous vote of the members present, and Mr. Frank W. Frueauff, Chairman of the Company Membership Committee, drafted a plan for enlisting the co-operation of Gas companies and manufacturers of appliances and apparatus. This plan was embodied in a circular letter recently mailed to every Gas company and gas appliance manufacturing concern in the country. The hearty reception accorded this new form of membership is shown by the following list of companies which have responded to the invitation to join the Association. The basis of annual dues upon which Companies are asked to join is as follows:

Schedule of Annual Dues of Company Members.

Companies serving less than 10,000 population	$10.00
" " 10,000 to 25,000 "	15.00
" " over 25,000 "	20.00
" " " 50,000 to 100,000 population	25.00
" " " 100,000 population	50.00
Foreign Companies	25.00
Holding Companies (in the event underlying Companies are in membership)	50.00
Manufacturing Companies	25.00

With such an encouraging start, as shown by the list of companies enrolled, there can be no doubt of the success of this attempt to raise funds for broadening the work of the Association. Gas companies will have a representation in the affairs of the Association, one delegate for each company member, and these representatives will elect the Public Policy Committee from year to year. The additional fund derived from company members' dues will not be used to defray the current expenses of the Association, but will be expended under the direction of the Public Policy Committee for such purposes as in their judgment will best serve the interests of the companies and the industry generally. Those companies which may not have given serious consideration to the matter are urged to do so at once. Application blanks may be secured from the Secretary of the Association, and all inquiries should be addressed to the headquarters, at 29 West 39th street, New York.

Company Members.—Gas Companies.

Aberdeen Gas Company.....Aberdeen, S. D.
Alliance Gas and Power Company, The .....Alliance, O.
American Gas Company Plants:

Bangor Gas Light Co.....Bangor, Me.
Burlington Light and Power Co.....Burlington, Vt.
Citizens' Gas and Electric Co.....Waterloo, Ia.
Kewanee Light and Power Co.....Kewanee, Ills.
Kingston Gas and Electric Co.....Kingston, N. Y.
Luzerne County Gas and Electric Co.. .....Plymouth, Pa.
Peru Gas Co.....Peru, Ind.
Petersburg Gas Co.....Petersburg, Va.
Philadelphia Suburban Gas and Electric Co..Chester, Pa.
" " " " " " ..Coatesville, Pa.
" " " " " " ..Jenkintown, Pa.
" " " " " " ..Pottstown, Pa.
Portage-American Gas Co .....Portage, Wis.
Rockford Gas Light and Coke Co.....Rockford, Ills.
St. Clair County Gas and Electric Co .....East St. Louis, Mo.
Waukesha Gas and Electric Co.....Waukesha, Wis.

Brooklyn Union Gas Co.....Brooklyn, N. Y.
Carolina Power and Light Co.....Raleigh, N. C.
Central Hudson Gas and Electric Co.....Poughkeepsie, N. Y.
Central Indiana Gas Co.....Muncie, Ind.
Charles City Gas Co.....Charles City, Ia.
Consolidated Gas, Electric Light and Power Co.Baltimore, Md.
Consumers' Gas Co.....Toronto, Canada.
Dawes Brothers, Inc.....Chicago, Ills.
Denver Gas and Electric Light Co.....Denver, Col.
Enid Electric and Gas Co.....Enid, Okla.
Grand Junction Electric, Gas and Mfg. Co.....Grand Junction, Col.
Greencastle Gas and Electric Light Co.....Greencastle, Ind.
Hattiesburg Traction Co.....Hattiesburg, Miss.
Jackson Gas Co.....Jackson, Mich.
Keene Gas and Electric Co.....Keene, N. H.
Laclede Gas Light Co.....St. Louis, Mo.
Lebanon Gas and Fuel Co.....Lebanon, Pa.
Lincoln Gas and Electric Co.....Lincoln, Neb.
Long Beach Consolidated Gas Co.....Long Beach, Cal.
Malden and Melrose Gas Co .....Malden, Mass.
Marlborough-Hudson Gas Co.....Boston, Mass.
Meridian Light and Railway Co.....Meridian, Miss.
Montgomery Light and Water Power Co.....Montgomery, Ala.
Municipal Gas Co.....Albany, N. Y.
Paducah Light and Power Co.....Paducah, Ky.
Peoples' Power Co .....Rock Island, Ills.
Portland Railway, Light and Power Co .....Salem, Ore.
Pueblo Gas and Fuel Co.....Pueblo, Col.
Saginaw City Gas Co.....Saginaw, Mich.
South Side Gas and Electric Co.....Mesa, Ariz.
Spokane Gas and Fuel Co.....Spokane, Wash.
Traverse City Gas Co.....Traverse City, Mich.
Watertown Gas Co.....Watertown, S. D.
Woonsocket Gas Co.....Woonsocket, R. I.

Manufacturers.

Blaugas Company of America.....New York, N. Y.
General Gas Light Co.....Kalamazoo, Mich.
Pittsburgh Water Heater Co.....Pittsburgh, Pa.
Philadelphia Stove Co.....Philadelphia, Pa.
Reznor Manufacturing Co.....Mercer, Pa.
Welsbach Company .....Gloucester, N. J.

CURRENT MENTION—

"VAN," writing from Renovo, Pa., under date of the 10th inst., informs us that the Gas Engineering Company, Trenton, N. J., Mr. F. D. Moses, President, will construct the manufacturing and distributing plants of the gas works that are to be operated in Renovo, Pa., under the title of the Renovo Consolidated Gas Company, at Paddy's Run, Pa. The Moses contract calls for main laying necessary to complete the system, and a holder up to retaining 50,000 cubic feet. The plant will be completed about mid-September. The officers of the Renovo Consolidated Gas Company are: President, Geo. L. McCloskey; Vice-President, Dr. W. G. Moorehouse; Treasurer and Secretary, E. T. Swain. The officers and Messrs. A. E. Gruyan and D. F. Spangler comprise the Board of Directors.

WRITE to Mr. A. S. B. Little, General Manager, The Atlas Paint Company, of Nashville, Tenn., for a copy of the Company's latest publication, known as the "Dealers' Catalogue." It lists completely the various paints and varnishes manufactured by this progressive concern, the goods from the shops of which must be close to the real thing; if one may convince himself on that account through the number of repeat orders that the Company is constantly receiving.

THE proprietors of the Charlestown (Mass.) Gas and Electric Company have announced that, beginning the 1st prox., the selling rate will be: Gross, 90 cents per 1,000 cubic feet; discount for prompt payment, 10 cents per 1,000; or an 80-cent. rate for Treasurer Samuel J. Fowler's well-managed gas corporation.

"J. A. M.," writing from Key West, Fla., under date of the 6th inst., said, amongst other things: We are about finishing the gas plant here, and we have had considerable difficulty on many accounts owing to local conditions. Almost every foot of the trenches had to be blasted, by means of labor high in its estimate of remuneration and excerable in its method of doing; further, even of this quality, it was hard to get. Perhaps my assistant here (Mr. N. H. Gellert, formerly with the only "Jack." D. Shattuck, of Chester, Pa), will have something to say to your readers about our trials and tribulations; also our successes, which were many. When we start up here we will begin with about 2,300 consumers, 1,600 of whom have signed up on gas stove account.

MR. RALPH A. CARTER of the Malden and Melrose (Mass.) Gas Ligh Company, in company with Mr. E. R. Hamilton, of the Providencet (R. I.) Gas Company, started, the morning of the 11th inst., for a trip to England and the Continent that will require 2 months time for its completing. The trip is really taken for the purpose of looking over some of the larger installations of vertical benches, and with a view to getting some actual working data respecting the manufacture of carburetted water gas abroad.

"THE Davenport-Fish-Soper trio (and a bustling aggregation it surely is) has had the satisfaction of carrying out a demonstration of how to use gas in the homes and the halls of Taunton. It was brought off in Odd Fellows' Hall, from May 20–25 inclusive, day and evening, the cooking and appliance uses of gas being very thoroughly demonstrated under the speech and action of Miss Ruth M. Wilson. The Company, however, had determined to show in full measure that gas was as useful, dependable, successful and economical means of obtaining light as it ever had been, and to that end a well planned system of exterior and interior illumination in front of and inside the hall was maintained. The use of gas in the different channels was supplemented by a gas kitchen in a modern flat house, the showing of the virtues of gas water-heaters (these were very cleverly demonstrated by Mr. Jno. M. Forbes) and gas meters of the display sort were constant magnets of attraction, for several specimens of these were so constructed that one could see through the glass fronts the expanding and contracting of the gas parts with the subsequent motion of the dials in the recording of the flow. The display was, as noted, closed the evening of the 25th ult., and the Company has more than doubly recouped itself for the expenditure incurred through added use of gas on all accounts since then in busy Taunton.

THE Consolidated Gas Company has added to its real estate holding the plots Nos. 136, 138 and 140 East 15th street, immediately adjoining property owned by it on the same street, in fact, adjoining its office property at Irving Place and 15th street.

THE employees of the Brockton (Mass.) Gas Light Company, at their annual meeting (Employees' Association) elected the following officers: President, J. P. Moran; Vice-President, Jer. Sheehan; Secretary, Peter Creeden; Treasurer, Wm. Morton; Executive Committee, Messrs. H. K. Morrison, M. Jodoin and John Wise. It was voted to hold meetings the first Monday of each month, and 60 took part in the balloting. A well served luncheon was enjoyed.

THE Jefferson City (Mo.) Light, Heat and Power Company, of which concern Mr. P. A. Bertrand is the capable, go-ahead General Manager, has been taken over by the Western Railways and Light Company, and he was authorized by the new proprietors to make many changes in its gas and electrical equipment. The contract for the additional gas apparatus has been placed with the Gas Machinery Company, of Cleveland, O., and it includes a new exhauster, tar extractor, purifier sets and the necessary connections.

BEGINNING last Monday, Miss Emma A. Winslow, on behalf of the Milford (Mass.) Gas and Electric Light Company, conducted a most attractive and well attended demonstration of how to cook with gas that lasted a week. Meanwhile the lighting force of the Company, at stated times each evening, gave excellent working illustrations of how best to use gas as an illuminant. The affair was extremely creditable to everyone concerned in it.

(*Continued from page* 417.)

where you find quite a wide range of readings in testing, you are really dealing with an unsound meter, or at least such is very likely to be the case. I would look for something wrong in connection with such a meter. We have found that the increase in volume is not simply on the first or second run, but that you might run 12 or 15 successive tests and stiil have an increase in volume. Of course, after a certain number of runs it will become less-and-less, showing that the possible vaporization of condensates is being reduced. In other words, you are exhausting the condensates that will gasify under those conditions. Bear in mind that units of volume of gas or atmospheric air cannot be handled with the same ease that liquids or solids can be, and while we have understood the important factor of temperature, I do not think until quite recently we recognized the increased change in the volume traceable to condensates present has been recognized. [Mr. Schiller here ran a number of photos through the stereopticon, showing that the Company's meter shops were modern in every sense.]

The President—Mr. Schiller prior to beginning to read his paper, said he had nothing more than a recital, but I think all will agree it has developed into a very pleasing and instructing lecture. I have asked a good many men throughout the State to discuss this paper, but without success. I presume it is because Mr. Schiller is connected with the largest meter shop in the State and no one else had much more to add to what he had to say. I am sure we are very grateful to Mr. Schiller for the information he has given us.

The President introduced Mr. Edward Curry, of Joliet, Ills., who read a paper in respect of

GETTING NEW BUSINESS.

When asked to prepare a paper for this Association, I at first felt that it would be "Bearding the Lion;" but, after due consideration, I decided that our interests were mutual, and that no doubt we could help one another gracefully. Since that time, the Company I am with has acquired a number of gas properties, and the contract part of these companies comes more or less under my department.

Right now let me say that I do not intend to tell anyone here how to run his business in the territory where he understands existing conditions, as one not familiar with them can. Papers on this subject are so apt to be similar that if I succeed in bringing out any new points, I will feel that same has not been in vain.

I can't see wherein soliciting for new business in the electric field differs materially from that in the gas industry, therefore, I will probably not put before you any new tricks of the trade. The first point to impress on the district salesman is politeness. I don't believe that too much stress can be placed on this point. You have all experienced a feeling of repugnance when either a fresh, or overdressed, salesman calls on you, and, with no tact, reaches for your hand, at the same time asking you to smoke a cigar. Your first impression is that he is too fresh, and you have at once put a "chip on your shoulder" that will take some valuable time to displace.

I am a firm believer in the following method of approach: The salesman walks into Mr. Zimmerman's store. If that gentleman is busy with a customer, the salesman should take a position at a point far enough away from the prospect so as not to embarass him with his customer. After the customer has left the store, the salesman should step up and introduce himself, making no advance to shake hands, but be ready to do so should the storekeeper show such inclination.

State your business, and if it is your first call, and he seems anxious to go about his work, tell him that you have been appointed to represent your company in the district, and want him to know that you are anxious to serve him, if he is in need of suggestions on the lighting, or any changes in his present system. Then leave. You will have made a favorable impression, in fact, you will be lucky if you can make the first call under these conditions. That storekeeper will remember you and when he has time to think of improvements, he will quite naturally think of you when the subject of lighting comes up.

The introduction or opening remarks must vary in their nature to suit the character of the individual, and the varying circumstances and environment in which he may be found. One must depend upon his judgment and intuition in deciding upon the best introduction to use in each particular case.

In making his plea before a jury, a good lawyer will first secure attention through some striking remark or apt story; but, attention once secured, he will proceed with a clear statement of the salient points in the case, in the order that he has previously decided will prove the most convincing. His method of securing attention might vary with the mood or disposition of different juries, but the logical statement of his case would require that he use the same order before the jury as before any other. In like manner the salesman may vary his introduction to suit the particular individual, but he should have one best way of stating his case with all the earnestness and art at his command. In the primary talk, the language should be so couched as to allay prejudice and win confidence. The more completely confidence is won the greater will be the influence of the talk. Without confidence the primary talk cannot in any possibility have its desired effect. If the customer's confidence is not secured at the outset, he will not be receptive to any suggestions that the salesman makes. Lack of confidence and mistrust steel his mind against all arguments and persuasions. Confidence is the foundation of commercial transactions, and without it there can be no common ground for agreement.

One should be natural in his statements, and in the manner in which he makes them. No theatrical airs nor speech-making recitation will succeed. Be earnest and speak with conviction. Be modest in statements, at least to start with. Great claims at the start are likely to awaken incredulity. Later on, when confidence and interest have been secured, large claims may be put forward without arousing mistrust, provided they are truthful. In order to win confidence you must create the feeling that you know your business. Know what you are going to say, and how you are going to say it. Hesitation and blundering statements will forfeit confidence at once.

The first advantage of brevity in the selling talk is that you create the feeling that you desire to be brief, and not take up too much of the customer's time. A consideration for his time will cause him to lend more willing attention. You do not confuse the judgment of the customer by many details, and make it easy for him to grasp your case at once.

The article for sale should first be analyzed with reference to production, utility, quality, comparison, etc., and the most striking selling points selected and arranged in the best order. A striking or catchy point may be placed first to gain attention, and then the other points should consist of the merits or attributes of the article that make it desirable. Naturally the order of arrangement may vary to suit the nature of the particular article.

Good health, honesty, tact, sincerity, enthusiasm and optimism are six more requisites which are necessary in the make up of a good solicitor. A solicitor must be in good physical condition. The time has gone by when it is necessary for a salesman to drink himself in to an order. A man whose business is worth anything to the lighting company is usually not the one that requires a great deal of treating to get him to sign the contract. A cigar, in my way of thinking, is appreciated more by a prospect if handed to him when you are leaving. He will not be so inclined to think it is a bribe.

A man who is not strictly honest is a fool to try to fill a position as salesman, as he has no chance at all in a long run. Temporary sales may be gained by falsehood and dishonesty, but permanent and lasting success is not built up that way.

Tact is the ability a salesman shows to get along agreeably with different kinds of people, and it is a hard matter to describe. Some acquire it, others have it, but it is necessary to a greater or lesser extent if a man will make a successful salesman. We should use tact in obviating as far as possible the unfavorable effect of interruptions. When interruptions occur, we should get the mind of the customer back upon the subject in hand as naturally as possible. This is illustrated in the life of James G. Blaine. While making an address, he was interrupted by a passing train of cars. He waited until the noise died away in the distance, and then said, "How fitting it is, ladies and gentlemen, that we should be interrupted by this roar of commerce, this emphatic evidence of our nation's great prosperity, fostered, protected and made possible by the wise republican administration, in whose behalf I am pleading with you." Thus he won back their attention and caused the interruption to contribute to the greater force of his remarks.

Sincerity and enthusiasm make friends and hold them. Where you find an irresistible salesman, you find a man who radiates enthusiasm, and he may have every other requisite that is needed to make a good salesman, but he would be a failure if he lacked that.

Optimism is always associated with ambition, enthusiasm and self confidence and is the most desirable and necessary qualification in the make up of a salesman. You quite frequently hear a man say, "I don't think I can get Brown to sign up." Right at the start that

salesman partly admits that he isn't capable of selling Brown what he knows the man should have and is able to pay for. On the other hand, the optimistic salesman goes to the prospect, certain that he will get the business, and if he comes away without the contract, he has a stronger determination to get it the next day, and is sure that circumstances alone kept him from getting it then.

Our agents are each allotted a certain district, and are expected to call at least once in every two weeks, if only to say "How do you do" to each of the business prospects, and once a month on prospective residence business. He turns in a daily report showing the call made, the proper address and the amount of business secured. If no business is secured he states the nature of the prospective business and the prospects of securing in the future.

He keeps a careful record of all prospective business, and at certain intervals letters are written to these and descriptive matter sent, such as monthly magazines, which contain interesting reading on our industry, descriptive folders, follow-up letters, etc.

All complaints are given to the salesman whose business it is to go carefully into each complaint and report to the office if he finds it impossible to adjust same. Each salesman is paid a commission on all business secured, and is penalized for all business lost in his district, and it is up to him to stop a cut-off.

The increased use of the electric sign for advertising has become so great during the past few years that particular attention is paid to securing this class of business. The up-to-date storekeeper wants advertisement of some kind over his store, but hesitates because of the expense, not knowing how small a sum will pay for a good gas arc sign or an electric sign.

We have found that, to secure the larger lamp letter and roof signs, it is better to have a sketch made up before approaching the customer, showing full details as to price of wiring, erecting and cost of electricity per hour. This method takes up more time than the old one, but we have shown the prospect our plans and have probably created the desire. The cost of this kind of advertising is so little, compared with any other good method, that the comparison is very favorable to the lighting companies. Large roof signs of several hundred lights can be maintained for a trifle over $1 a day, and that same dollar would pay for only 5 inches single column in your newspaper, figured at a rate that you can seldom get in larger cities. I am not saying that newspaper advertising does not pay, because it is my belief that it does; but a good sign will supplement all such advertisements and triple their value.

The author having said that his Company had until recently been strictly an electric company, which would account for the first paragraph, the President invited

Discussion.

The President—This very complete paper on the commercial side is ready for discussion. Mr. Armstrong?

Mr. Armstrong—Mr. Curry's paper hits the nail on the head in more than one instance. In directing our solicitors we keep everlastingly before them that, unless they are absolutely honest, they will never meet with success; further, if we ever found that false statements were made by our men they could not remain with us. All will agree with Mr. Curry that the salesman who succeeds is the one who can gain the confidence of his customer, and while talking to him, look him straight in the eye, giving him plain, concise facts. Don't "ramble." Likely he is a busier man than the solicitor, even anxious to hear you and to decide as regarding the proposition of fered. Another thing we impress strongly on our solicitors: Don't be ashamed to say "I don't know," in case asked a question you cannot positively answer; but add "I will find out and let you know definitely." Then, make it your business, having found out, to report back. I have no doubt a good many questions are asked by the prospect, knowing full well what the answer should be, simply to see what sort of timber the solicitor is made of or if he is trying to "four-flush." Honesty at all times not only lasts, but is like a rolling snowball. Become known as strictly honest, the solicitor can go any where and be granted an audience. Yes, and like the snowball, that grows with each roll it makes, get more-and-more business because of his honesty.

The President—Will Mr. Beebe discuss this topic?

Mr. Beebe—I had not even thought of discussing this subject. One point, however, in the paper is in regard to the method of visiting all customers at least once each month. That would be quite a difficult thing to do in a city like Chicago. We operate commission salesmen, however, who accomplish that by introducing some small article in a systematic campaign. Each man is assigned to one street at a time. Using that as their leader they introduce larger appliances where they can after they have completed their talk on the article which they are introducing.

[On motion the convention adjourned to 9:30 A.M., Thursday.]

(To be Continued.)

[CONTINUED FROM PAGE 403.]

FOURTH ANNUAL MEETING, SOUTHERN GAS ASSOCIATION.

HELD IN THE SEMINOLE HOTEL, JACKSONVILLE, FLA., APRIL 17, 18 and 19, 1912.

FIRST DAY—MORNING SESSION.

Discussing the Congdon Paper.

[For the text of the Congdon paper on "Efforts to Please Our Customers and Render Efficient Service," see *ante*, p. 403.]

Mr. Ferrier—I believe it was Mr. Congdon who instituted this rule for his employees, that I think is a very good one: "Treat every customer as if there was another gas company around the corner." Another company that I was connected with made this general rule: "Imagine that every one making a complaint is a lady and answer accordingly." Having been requested to say a few words on this paper, and knowing that time is short and that others will have something to say thereon, I will be as brief as possible. The paper may be summed up in the statement that all of our dealings with our customers must be characterized by courtesy, veracity and integrity, and we so all agree, and continue to agree, despite the fact that we are probably as a class, along with our meters and other appliances, about the most abused creatures in the land. However, let us persevere in well doing and the victory will be the greater. Each of these virtues—courtesy, veracity and integrity—admits of amplification. Integrity means we must not only supply gas of a good quality, and be careful to supply the most efficient appliance on the market. Let the first requisite be efficiency. Advise all against installing appliances that you believe would cost more in the operation than they could afford to pay. I believe the time is at hand when we will find it expedient to publish our balance sheets. Where the people at-large find out the cost of gas in the holder, they jump to the conclusion that, this being the only cost, exclaim, "What robbers these gas companies are!" When they come to know just the number of cents of profit per 1,000, we will note much of that feeling has been torn down, and the self-seeking political spouter and the no less self-seeking scribbler will have vastly less attention. People as a rule are inclined towards a square deal, and their ignorance of the facts is the greatest cause of our trouble with them. I will conclude in mentioning a specific instance: Some time ago I met a customer who complained in a very courteous way about a gas bill. I made a personal investigation and found that a workman, in connecting the fuel meter (we have two rates, one for illuminating, the other for fuel), had hooked it to the outlet of the illuminating meter. Of course, you can understand what kind of a bill he had where the quantities were measured with one meter. I said to him: "We are owing you so many thousand feet of gas, and you will receive no bill until that is made up." This advertisement later on appeared in our daily newspaper—it was signed by the president of a bank—and we did not pay for it:

"Some time ago I made a great 'blow' about the First National reminding people of money that they had left with us and forgotteu about—nothing like blowing your own horn, you know—but the Rome Municipal Gas Company has beat me at my own game. At my home there are two meters, one for registering the illuminating gas and one for the fuel gas, the latter being much the cheaper—the workmen in putting in the pipes and the meters left it so that fuel gas was registering as illuminating gas as well as fuel, with the result I was paying about 2½ times the price for the fuel gas. It was left for the Gas Company people to find it out themselves, and they not only corrected it for the future, but they paid me back all the overcharge for the past year."

Mr. Zeek—The public is becoming more and more discriminating every day, due to the fact that salesmanship is growing to be such a science. As the salesman goes up and down through the streets of a city, knocking at the door (and there are many besides gas solicitors and salesmen) the householder or resident has learned to say, "No."

There was a time when they didn't do much of that, but now they do, otherwise there would be no time left for the babies. Mercantile houses are recognizing that fact by putting on men as salesmen who can discriminate, therefore, we are up against quite a different proposition. Mr. Congdon gets at the facts in a decidedly good manner, a manner that shows the splendid organization in his place. As I went over my situation, trying to find something to say, I jotted down a few items and compared them with his paper only to find he had them all, so I can't add anything new. One thing I might quote concerns where we place some of our emphasis, and at what point. The first that suggested itself is the importance of not allowing the customer to get out from us in ill humor. Of course, we don't always succeed in that; but such is our purpose. We undertake to not allow a consumer to get out feeling displeased, and always strive to let him know we are willing to do what we can to look into the mat ter and straighten it up. The next point on which we seek to place high emphasis is in the intelligence of the person at the telephone. The chief clerk in our office handles the telephone, which might not always be advisable, but it is with us. There is a two-fold reason for it. First, he is or should be the most intelligent man in the office, and that when those orders come back to be charged on the books, they come right through his department. If not clear and a customer makes trouble about overcharges, etc., it is right there where it started from. We find this plan works out splendidly in reducing complaints and troubles with overcharges and improper filling of orders. We know how important it is to issue clear orders along that line; occasionally orders that are not clear have caused trouble. I like very much that idea of everybody being a salesman, which could be so to quite a large extent, even among shop employees, and it's quite surprising, in measuring up to that, how many useful men can be developed from the shop force. We at times put into effect the prize system for prospects from the shop force, giving certain prizes after a certain length of time for the person bringing in the largest number of prospects out of whom the solicitor succeeded in getting business. And it isn't so much for the purpose in that case of new business as it is to teach them courtesy, to get at and approach people, and to study human nature. This is also valuable in teaching them they can do something more than mere routine work. We all know the importance of collectors; and a snag we are up against is a collector may undo in a very few minutes the work of months of the solicitors, and it's important to have the solicitors and the collectors graded equally. I heartily indorse the idea of being anxious to test meters free of charge. Mr. Congdon gives us a schedule of charges under certain conditions. We place no limitations whatever on that, except to insist that the consumer or his representative be present. Even that also is flexible. Where they insist upon trusting us, it's hardly wise, it seems, to decline that trust; so we sometimes prove without the consumer being present. I want to say that that has not been burdensome, for comparatively few tests are requested compared with the large number of meters out, and I believe that it is very profitable in inducing good relations with the public. It also is interesting to know the result after things have been tried out. I am very much interested in knowing what Mr. Rushin's results have been in keeping the domestic relations of his employees straight. [Applause.]

Mr. Roome—I cannot go away from this meeting without expressing my deep appreciation for the paper read by Mr. Congdon. I represent a young and growing community (Miami) now in its infancy in the gas industry. Four or 5 years ago, a plant was started which it was thought would be sufficient for the wants of the community. In a short time, though, it became overcrowded, and that overcrowding led to our employees not taking as much pains to satisfy the customers as they should have done. We now have increased our plant by extending it, and we have an up to-date plant. I have been associated with it only a few months, but during that time and from the beginning I learned most of what Mr. Congdon has said as to the inefficiency and inattention of employees to our customers. Mr. Congdon strikes the nail right on the head, and I am more than 1,000 times over repaid for coming here, just for the teaching of this paper, for myself and for the stockholders of my Company. I tender my thanks personally to Mr. Congdon, and consider we are under great obligation to him. [Applause.]

The President—Any further discussion, gentlemen?

Mr. Davis—One point in Mr. Congdon's paper that has not been referred, to although every one of his men speak of it, is the absolute integrity of the Company. The Mobile Gas Company is the oldest institution in the town, having been started in 1834. We delivered gas in 1834, and we are very proud of the fact that our Company has paid all of its debts, never owed anybody that it did not pay, and our word is considered as good as our bond. We impress upon our men, when they give their word to a customer, they are making the promise of the Mobile Gas Company, the oldest firm in the city. I think it is true of almost all gas companies, that they usually are about as old and active concerns as any that exist in their communities, having probably the second or third largest investment in the community, wherefore, one of the largest taxpayers in the community. I believe if that point is impressed upon the men, who in turn mention it to the public, they cannot fail to increase the dependence and the belief that the public has in a gas company. [Applause.]

Mr. De Freese—The greatest value of Mr. Congdon's paper is particularly along the lines of educating the people, which he does through his organization. The success of any company depends very much upon educating the masses, meaning the people with whom they deal, particularly so in the gas or electric interest, owing to the fact of the growing antipathy against corporations and other public utilities companies. All through it Mr. Congdon tells us it is his effort to have the customer know what he is buying and how to use it. In addition, care is taken that people not capable of giving information to the public will not give such information, and I think that is good. I don't think it is good policy for all employees to give information to customers or to the public, because many times they misrepresent unintentionally, thus getting the company in bad repute. We should start at our offices, and I think each office representative here should weigh very carefully all those things carried in Mr. Congdon's paper. We ought to be very careful when beginning to do business with a customer. If he knows exactly that which he is buying and then knows how to use it, through the company having taught him, is the prime factor. It devolves upon the company to teach its employees, and the company should have some sort of educational factors. After all, it's the duty of the manager to see that his men are properly educated in their different lines, to see that capable foremen are placed at the head of departments, and to see that employees, as far as consistent, know how to discharge their obligations to the public. I think these are the things considered vitally in Mr. Congdon's paper, which I think is a splendid one, and while it doesn't point directly to any of these specific cases, it does on the whole.

Mr. White—This paper is to me one of the most valuable that will come before our Association, and I say that, after having read it carefully prior to coming here, and after hearing Mr. Congdon's able presentation, I think there is no other asset in any company so valuable as that of common courtesy. I don't know whether all of us fully realize how easy it is to become discourteous over the telephone. Waiting at a telephone one minute seems to cause us to feel the time has been 30 minutes, and that time is never so valuable as when we are waiting to get a response from the switchboard. Now, about putting people at the telephone switchboard? In our own case, we see that they are chosen carefully, that their voices are not too sharp, and that they are able to make the proper reply to a proper or improper inquiry over the 'phone. We spend many thousands of dollars to save 1 or 2 cents per 1,000 in the manufacture of gas, and we spend many thousands of dollars to put it through the consumers' meter, yet an improper response from any one in a company many times undoes the saving of 1 or 2 cents per 1,000 in the retort house by the loss of a very valuable consumer. We want to be in a position at all times to have the consumer feeling that he is getting the best end of it. We are spending many thousands to get right with the people, and I believe we are getting right. I believe people think and believe that a progressive gas company gives them as as square a deal as when they go elsewhere to buy a pound of sugar, some yards of dry goods, or any other commodity. This Association should extend to Mr. Congdon a most hearty vote of thanks. I propose to get several copies of his paper, handing one to every man in our company who, through being the head of department, comes in contact with the consumer. We can't do too much of that work. We can make gas, but if we don't get it to the consumer in good grace we are losing.

Mr. Walker—I cannot fail to express my observation of the importance of a sweet voice at the telephone. My wife buys groceries from a certain concern because a sweetvoiced lady answers the 'phone, and often I want to do it myself. (Laughter.) Another point that suggests itself to which I would like to call your attention—it is not new, perhaps, to a great many of you—comes through a happening in our office. A man complained at our charging him a

minimum bill, and our chief clerk, instead of saying to him, "Oh, that's the rule of the company," took him into the office and explained to him carefully the investment we have in the way of service pipe and meter, and the readiness-to-serve, never one minute mentioning "the rules of the Company." The customer went away satisfied we had a right to expect a fair return upon this investment that we had at his house; and since that occurrence I have cautioned and instructed our men in every department, never, under any conditions, to refer to "the rules of the company;" instead, to go at it carefully and explain the reasons why we should do these things. [Applause.]

The President—We will be glad to have any further discussion. I would like to hear from some of the practical men (fitters or solicitors) who meet these people.

Mr. Davis—Pardon me for getting up a second time, but it occurred to me that if some people not familiar with the gas industry should be listening to our discussion, they might think the gas men had many complaints and much trouble with the public. I believe the chief reason we have complaints (and we may always expect more or less of these) is in the fact that the man who sells electricity and gas through a meter is about the only merchant who cannot itemize his bills. The people have to trust us, because we cannot itemize our bill, as every other merchant can itemize. Hence we must have greater trust from the public than any other merchant needs.

[On motion of Mr. White, seconded by Mr. Ferrier, a hearty vote of thanks, taken by rising, was passed to Mr. Congdon for his able and interesting paper.]

The President then announced the appointment of the foll owing

SPECIAL COMMITTEES.

Nominating.—R. C. Congdon, Atlanta, Ga.; M. A. Bowlin, Jacksonville, Fla.; V. B. Day, Montgomery, Ala.; S. E. DeFreese, Chattanooga, Tenn.; MacD. Dexter, Columbus, Ga.

Auditing.—Harry Hanson, Mobile. Ala.; Frank Cooper, Jackson ville, Fla.; R. J. Maguire, Tampa, Fla.

President's Address.—S. W. Brown, Columbia, S. C.; A. W. Young, Knoxville, Tenn.; C. F. Zeek, Pensacola, Fla.

Telegram of Felicitation Centenary Celebration, Gas Lighting in America.—R. M. Redding, Macon, Ga; C. A. Case, Chicago, Ills.; Harry Schall, Detroit, Mich.

Obituary.—S. E. DeFreese, Chattanooga, Tenn.; R. C. Congdon, Atlanta, Ga.; John Parker, Rockford, Ills.

An adjournment to 2 P.M. was then ordered.

(To be Continued.

Gas as a Fuel.

[Prepared by a "MANCHESTER MAN."]

The views of English gas engineers on recent developments of gas engineering are summarized below. It has been realized during recent years that gas, which has hitherto been mainly considered as an illuminant, is becoming more and more a fuel, due to a considerable and increasing extent, that its illuminating qualities will be derived primarily from its heating or fuel characteristics. The process by which gas is now being so successfully used as a fuel for illuminating purposes is of high pressure, which yields a very considerable increase in the efficiency for lighting, which has hitherto been available; it also provides important advantages for furnace work. The high pressure system also suggests the means towards a considerable reduction in distribution costs. In large areas provided with electrical supply from a central power station, the current is invariably transmitted at a high pressure to a number of distributing centers, at which it is reduced for local distribution. In the United States, where natural gas is distributed over large areas, the same procedure is followed, as the pressure at the central station may be as high as 3 to 400 pounds per square inch, and in England and elsewhere "Mond" gas is distributed at a high prsssure, the supply pressure at the consumers' premises ranging from 5 pounds to 10 pounds per square inch. The distribution of gas under pressure is the new feature on which stress is laid, because the gas industry, except as applied to special industrial processes, has hitherto been built up on the assumption that the most valuable property of a gas was its natural illuminating power.

Now, we must consider gas from a new point of view. The gas at present is commonly made for urban use, at ordinary works, and is present produced by heating suitable and generally somewhat expensive coal in closed retorts, giving an average result of 12,000 cubic feet of gas per ton of coal, and having a clear calorific value of 500 B.T.U.'s per cubic foot, with in addition a coke yield of 65 per cent.; with smaller quantities of tar, ammonia and other by-products. But when a purely heating gas is required, other processes are more generally followed and some form of so-called producer gas is made. The term producer gas covers a considerable variety of gases, but there is an essential difference between them and ordinary town or coke oven gas; as the latter has about four times the heating value of producer gas of equal volume and it follows that on a heating value basis it is cheaper to distribute although more costly to manufacture. This suggests that for purely lighting purposes the retort gas should be distributed with producer gas made from the resultant coke for heating and power. A producer gas is made by the partial combustion of coal, whereas town and coke oven gases are mainly hydrogen and hydrocarbon distilled from coal, the mass of the carbon in which remains behind as coke. This distinction is fundamental, and although there are other important factors to be considered it is evident in a general way that producer gases start with an advantage over the distilled or retort gases. As is well known where retorts are used, 60 to 70 per cent. of the fuel is subject to an expensive manufacturing process, which does not add to its commercial value to any extent except in the case of coke ovens, where the coke is made for metallurgical purposes and the gas may be and very frequently is, a waste product.

The kind of producer gas most suitable as a fuel depends upon the use to which the fuel has to be put. Where the highest temperatures are required, water gas, preferably applied on the regenerative principle, is most used. For general furnace work a simple producer gas, made by blowing air, together with a small amount of steam, through incandescent coal, is taken direct whilst hot from the producers to the furnace. Originally steam was not blown into the producer unless for the purpose of creating a pressure of air under the fuel grate. At the present time, however, a proportion of steam is used, and if the producers are situated a considerable distance away from the furnaces it is invariably supplied. Without entering deeply into the theory of producer gas, the reason for the injection of steam may be briefly referred to. Apart from the secondary reactions which take place when air is blown through a deep bed of incandescent coal, partial combustion takes place and a mixture of inert nitrogen from the air and carbon monoxide, derived from the reaction of the oxygen of the air on the carbon, of the fuel, results. When this gas is burned it will generate 70 per cent. of the heat originally existing in the coal. The other 30 per cent. of the heat has been generated in the producer and shows itself in the high temperature of the gases leaving the producer. If these gases are immediately burnt in the furnaces this high temperature is useful, and a part of the 30 per cent. is usefully recovered, but if the gas is cooled down, this 30 per cent. is lost. If, however, steam is blown into the producer with the air, part of this 30 per cent. generated heat is spent in causing the steam and the coal to react. As a result of these reactions a mixture of carbon monoxide and hydrogen is produced, which adds to the total amount of heat which can be obtained when the resultant gas is burned. On the other hand, of course, the gas as it leaves the producer is at a reduced temperature as compared with that from the air-blown producer; which means to say that the heat gained in one direction is lost in the other.

It has been experimentally ascertained that there is a limit to the amount of steam which can be usefully injected, considered purely from a heating point of view. Should it be intended to use the gas in gas engines, or to distribute it through mains, it is essential that it should be sent out in a clean and cool condition, and that all the heat in the gas due to the temperature at which it leaves the producer is lost. It follows that as much heat as possible must be converted by the use of steam into the other form and, for that reason, the air blown producer is not so frequently employed at the present time, at least in England. There is, however, another factor, which has to be considered, for most but by no means all coals and carbonaceous fuels contain nitrogen, which can be recovered in the form of ammonium sulphate from the gas generated in the producer; the yield of ammonia depends upon the temperature of the producer, and in order to obtain a large yield a very large amount of steam is blown into the producer, with the result that both the total heat in the gas and that per cubic foot are reduced below the maximum. The retort or the distillation method can be arranged to give a greater yield of by-products, or at least a more varied yield than the producer method, and with the net cost of gas tending more and more to depend upon the by-products, it may happen that a combination of the two processes will prove most useful, the hot coke from the retorts being at once transferred to a producer and then blown with air and steam to give producer gas. Apart from the process of manufacture other changes would seem to be desirable, particularly in distribution, the cost of which forms a considerable proportion of the outlay incurred by consumsers.

Management & Commercial Methods.

A NOVEL USE FOR WATER GAS TAR.—The Conestoga Traction Company, of Lancaster, Pa., of which corporation Mr. C. Edgar Titzel is General Manager, has recently been using water gas tar on its roadways to excellent advantage for the purpose of killing weeds, settling the dust and beautifying the track. The Conestoga Traction Company has 162 miles of city and suburban track, covering practically the whole of Lancaster County.

The Lancaster Gas Light and Fuel Company (an allied Company operated under the same management) makes water gas, and, until last year, the tar, which as a by-product, was never utilized in any way, except for burning under the boilers. When used in this way it necessitated constant repairing of the boilers; so, after a time, it was decided best to stop using it for this purpose and to try to find a better market for it.

Shortly thereafter experiments were made with the tar. The entire works' yard, in which it took considerable labor was taken up in keeping the weeds down, being sprinkled with it, as well as the street fronting the Company's property. The tar was found to settle dust fairly well and to effectually kills the weeds. The tar was put on last July since which time not a single weed has made its appearance.

This fact was called to the attention of Mr. H. W. Crawford, Engineer, Conestoga Traction Company. Shortly thereafter a small tank and sprinkler were fitted on a truck, and the work of sprinkling the track was begun. It was soon found to work so well that a tank car holding 1,000 gallons was built and preparations were made to oil the entire roadway. Shortly afterwards another car was secured, so that the Company now has two sprinkler cars and is prepared to carry on the work to excellent advantage.

The tar, which is stored in the gas works relief holder, is pumped from there into a small tank, and from this tank through a 2 inch line for about 600 feet to the tank car, which is placed on the trolley siding situated on the works' property.

The tank car is simply a small tank, about 4 feet in diameter and 15 feet long, placed on an old truck. At one end a 2 inch hole is tapped in the bottom of the tank and connected up by a 2 inch line with the sprinkler. A plug-stop is placed in the line, so that the tar can be turned on or off.

The sprinkler is a piece of 2-inch iron pipe, capped at either end, and just the width of a tie. It is supported by two adjustable rods, which regulate the distance of the sprinkler above the rail, and is attached to the outlet of the tank by a 2-inch hose. On the bottom of the pipe, for use as the sprinkler, are three rows of $\frac{3}{16}$ inch holes, staggered, so that when the tar is turned on a constant and uniform stream is thrown across the entire track. The part of the sprinkler directly above the rail is blanked to prevent any tar from getting on the rail. A 2 inch wire, flue-brush is fastened to a $\frac{3}{4}$-inch pipe, and this is run through the sprinkler at intervals so as to clear out the leaves or other refuse which, collecting, tends to stop up the holes.

The tank cars cost about $100 each, the tank holding 1,000 gallons being purchased for $68. Old wheels and lumber were used in the construction of the trucks.

The Gas Company had about 200,000 gallons of the tar in stock, so that the Conestoga Traction Company has been enabled to oil practicall its entire roadway.

The tar is sold to the Conestoga Traction Company for 2 cents per gallon, just as it comes from the relief holder, very little trouble having been experienced with water. The tank car is pulled by a motor car, with a crew of three men; motorman, conductor and brakeman; the conductor and brakeman acting as oilers while the sprinkling is being done.

It has been found to take a little less than 3,000 gallons of tar per mile of track, the total cost of the tar as applied being about $60 to $65 per mile of track. There are a number of stretches of track on which the tar was applied last year, and this year, in spite of many and heavy rains, the weeds have failed to make their appearance. Much of the track is alongside the turnpikes which are much travelled and very dusty, and so it has had a very severe test.

Previously it took a number of men in the summer to do nothing but pull weeds, and it is practically impossible to keep the weeds down in this way without spending an unwarranted sum of money. The tar, in addition to absolutely killing the weeds, is also believed to lengthen the life of the ties, although this cannot be definitely stated until more time has elapsed. The tar carries with it a slight odor of gas, but this soon disappears and is in nowise objectionable.

It is estimated that this oiling of the track will cause considerable saving in the maintenance of way, at the same time keeping it in much better shape than heretofore. It is believed that one application of the tar will last for 2 years, and that after several applications the roadbed will be so saturated that the growth of the weeds will be stopped for a considerable length of time.

There is no reason why trolley companies and gas companies cannot be mutually benefitted by the use of tar for this purpose; the trolley companies securing a first-class weed killer, and the gas companies a profitable market for their by-product, profitable, because the tar can be sold in this way without any preparation whatever.

Items of Interest
FROM VARIOUS LOCALITIES.

AT the annual meeting of the shareholders in the corporation controlling the public utilities of Montreal, Canada, it was developed that the Directors had purchased a site for an auxiliary gas plant in the West End of the city in the district of cote St. Paul. It was also noted that the concessions during the year in the rates for gas and electric currents amounted to something over 1 per cent. on the capital stock. After Mr. H. Gordon Strathy had, on behalf of the shareholders, congratulated the Board on its very successful management of the Company's affairs, the retiring Board was named to succeed itself; and later on the Board reorganized by naming the executives of last year.

"T. V. M.," writing from Rochester, N. Y., under date of the 8th inst., says: "Last Thursday a number of the residents and property owners of Cayuga, N. Y., appeared before the Public Service Commission for the District sitting in Seneca Falls, and advanced argument supporting their petition that the gas rate in Cayuga should be reduced. The complainants were also represented by counsel in the person of Mr. L. G. Haskins, of Geneva. The gas rate in Cayuga is $1.50 per 1,000, and the supply is obtained from a high pressure line connecting Geneva with Auburn. Mr. W. N. Rumble, a former Clerk of the Village Board of Cayuga, declared that, when the Company some years ago obtained the right to lay the mains, its representative promised that the gas rate would be put at $1 per 1,000, as soon as the system was established. Mr. Rumble, however, naively added that 'that provision was not included in the franchise terms.' Mr. Henry L. Coleman, who is in charge of the Auburn concern and its subsidiaries, positively asserted there was no profit to the Company in selling gas at $1 50, as only 48 consumers were on the lines. Commissioner Sague rendered no decision in the premises, although he did, in off-hand way, so speak as to incline his hearers to the view that he would not favor any change in the charge. He did, however, order the Company to install any services regularly applied for which did not require the placing of over 200 feet of pipe per consumer."

WE understand that Mr. John F. Stratton, formerly in the office service of the United Gas and Electric Company, of New Albany, Ind.—he has been actively engaged in the confectionery business for a year or so—is slated to succeed Mr. R. W. Waite as Treasurer of the Company.

MR. JOHN BOELTER, since 1898 in the employment of the Watertown (Wis.) Gas and Electric Company, resigned his position with that corporation in order to accept the management of the local building known as St. Henry's Hall.

AT the annual meeting of the shareholders in the Georgetown (D. C.) Gas Light Company, the officers elected were: Directors, S. T. Brown, George L Nicholson, W. B. Orme, R. H. Goldsborough, C. P. Williams, R. D. Weaver, W. A. Leetch and H. H Flather. The only change is the substitution of Mr. C. P. Williams for Mr. William A. Mearns. However, the change is rather nominal than real in that both gentlemen are in partnership in another business.

MR. WILLIAM H. SNOW, who took charge of the New Bedford (Mass.) Gas and Edison Electric Light plants last Saturday, will not have much trouble hereafter in keeping accurate measure of the flight of time. This occurs to us from the fact that, a week or so before he made the journey to New Bedford, several of his men in the operating ranks of those who keep the Holyoke (Mass.) gas and electric light plants going, called on him. The delegation was headed by the veteran "Pat." Curran who, having intercepted the "Super.," handed to the latter a beautifully put together example of an Elgin watch of up-to-date make. "Pat." made a presentation speech that was really pathetic, and the "Super." had about all he could do to make an appropriate speech expressive of his surprise and appreciation.

MR. SUMNER B. STILES, more or less of a New York city attorney, has instituted suit in the Supreme Court against the Consolidated Gas Company, of New York, seeking to recover the sum of $4,625 as penalty for shutting off his gas when he refused to pay the $1 rate per 1,000 cubic feet when the question of the legality of such rate was being tested in the courts. Stiles seems to have a case of the flimsiest

sort, since he paid the $1 rate for a period of 15 months, at the end of which spell the Company cut off his supply, because of his refusal to pay the excess. The gas was shut off in October, 1907, and was turned on again in December, 4 years afterwards. He sues under the statute providing a penalty of $10 for the first day without gas, plus $5 for each day thereafter that he was precluded from its use.

CONSTRUCTION work on the electric division of the proposed gas and electric plants of the Harvard-Ayer Gas and Electric Company, Harvard, Mass., has been commenced. The owners declare that the gas plant section will be commenced in August. Mebbe so.

MESSRS. HUTCHINSON & DENHAM are the architects who have designed the plan for the Mobile (Ala.) Gas Company's up-to-date, new office building, that is now in course of erection at the site on Davis avenue and Marmotte street.

THE stockholders of the Cincinnati Gas Transportation Company have elected four new Directors in the persons of Messrs. J. B. Foraker, Jr., C. F. Windsick, F. B. Enslow, Chas. P. Taft and H. L. Brennenan. The Directors in turn elected executives: President, J. B. Foraker; Vice-President, F. B. Enslow; Treasurer, M. E. Moch; Secretary, Theodore Claus.

JUDGE HOLLISTER is responsible for the order issued the 5th inst., extending time for sale of the properties of the Hamilton (O.) Gas and Electric Company to the 9th prox.

SOME of the provisions of the franchise, passed to the proprietors of the old Elgin (Ills.) American Gas Company by the Commissioners of Elgin, which will be voted on by the citizens of Elgin the 29th inst., are these: The grant is to last 40 years, beginning with date of adoption by the people, providing Company within 30 days files acceptance and bond of $25,000, and a further $25,000 as part of bonus to city:

Gas Rate.—95 cents per 1,000 cubic feet, net, as now, until Jan. 1, 1913, after which it will be 90 cents, net. That figure to be the maximum under the ordinance; a minimum charge of 50 cents a month to be granted when consumers fail to use more than 500 feet.

Rate Arbitration.—Rate to be arbitrated every 5 years for period of 5 years next succeeding. An arbitrator to be appointed by Council, another by the Company, and a third by these two. If Company fails to appoint arbitrator, or if two cannot agree on third, the choice shall fall upon the senior Judge of U. S. Circuit Court of Appeals for Circuit which embraces Illinois. If any city in district be given a lower rate than Elgin, the consumers of Elgin shall be given a like price. But the Company may supply to the Watch Company and other manufacturers at lower than the general prices.

Bonus.—Company to pay city $65,000, $25,000 within 30 days after franchise is adopted by the people, and $1,000 on January 1st of each year, beginning with Jan. 1, 1913. This $25,000 is to be used in paying for the construction of a water standpipe on public account.

Gas Plant Removal.—No gas is to be manufactured in Elgin after January 1, 1915, the present plant to be used only as an emergency one for Elgin's gas users after that date.

Purchase by City.—The city may purchase the Elgin gas properties at any time by giving a year's written notice of intention. If city and Company are unable to agree on price, that shall be fixed by an arbitration committee; but city does not waive right to acquire properties by condemnation, if desired. And in arriving at price only value of tangible properties shall be considered.

Reserve Right to Regulate.—The city waives no right to regulate price, quality, purity or mode of distribution of gas, which it now has or may acquire. No rights vested at any time in any commission or board by State law are waived; and if a State public utilities law ever exempts from operation companies then having franchises, the present franchise is abruptly terminated.

Quality of Gas.—Not less than 600 B.T.U., gross, and 16-candle power, determined by carefully prescribed method.

Purity of Gas.—Must be free from sulphuretted hydrogen and percentage of carbon monoxide, sulphur and ammonia is carefully regulated.

Pressure.—Uniform and well governed pressure between certain defined limits provided. Mains must be maintained of adequate capacity for pressure, and must be made and kept in efficient state.

Meter Inspection.—Company to refund proportionate amount on bills for 3 months past, if meter is found running fast—outside of limit under the present statutes prevailing in this respect. Slot meters must be installed at request of patrons not behind in bills.

MR. CHARLES A. DETWILER, the competent Secretary of the Pittsburgh Water Heater Company, has announced that he relinquished that official connection with the named corporation Saturday last. Mr. Detwiler has served the Company since the reorganization of the Company in 1907. Hereafter he will be located in San Francisco, as Special Representative for the Pacific Slope, of the Pittsburgh Water Heater Company, and will also be associated with the Joseph Thieben Company, of San Francisco, in the capacity of Manager of its extensive water meter sales' division. This change of base will undoubtedly surprise many of "Det's" legion of friends, but of this he may be sure—everyone of the legion wishes him the best of good luck wherever he goes.

PRESIDENT JNO. W. ELLIS, of the Providence (R. I.) Gas Company, has returned from his jaunt through Europe, which kept him 41 days from home. This journeying was made especially with the view of acquiring current knowledge respecting gas practice in the large European centers, more particularly perhaps in Germany, France and Switzerland, and with especial reference to the best favored systems of coal carbonizing under vertical methods. That Mr. Ellis has completely mastered the way of not speaking until the proper time has arrived, would seem borne out in this. Hardly had he recovered his normal state of breathing, which was a bit disorganized on account of a brisk ride to his office, when a reporter of the local "Bulletin" appeared on the scene, and relieved himself at short range of a volley of queries as to what he had observed while in Europe. To these fore-and-aft shots President Ellis replied: "A statement of what I observed while in Europe probably would be of no general interest, for it is doubtful if anyone not engaged in the gas business would understand what might be said. Besides it is too early to talk about the gas works in Europe, for the information obtained is not yet in shape for consideration."

MISS GEORGIA M. LE VAN has resigned the task of editing the publication entitled "Gas," which is printed monthly in connection with the interests and doings of the employees of the Consumers' Gas Company, Reading, Pa. Her successor is Mr. J. Victor Kline.

THE Nashville (Tenn.) Gas and Heating Company, having taken over the plant and franchises of the Nashville Gas Company, has given notice of the making of a 6 millions bond issue to Girard Trust Company, of Philadelphia. Of this ⅓ will be issued immediately, and the balance will be emitted from time to time as the necessities of the Company are increased. The bonds will bear 5 per cent. interest, and will mature May 1, 1937. After May 1, 1927, the Company will pay to the Trustee the sum of $25,000 each year to be held as a sinking fund, and bonds will be called in by the monies in the fund for redemption, at a price not to go above 105 and accrued interest.

MR. H. M. PAPST, General Manager of the Portland (Ore.) Company, has been authorized to construct a new gas works, that will have a capacity of 15,000,000 cubic feet per diem. And the planning also provides for a rearranging of the distributing system (including 6 miles of high pressure delivery lines) that means, when finished, an addition of perhaps 60 miles to the existing total. Preliminary work has been underway since May 21st, and the end will not be until well into 1913. The entire work is under the planning and direction of Mr. Papst.

MR. WM. F. CROSTON, formerly in the service of the Rochester (N. Y.) Railway and Light Company, has been appointed Superintendent of the Watertown (N. Y.) Gas Light Company. Mr. Croston is a graduate of the University of Rochester (Class of 1904), and has been with the Rochester Railway and Light Company, up to the 16th inst.

THE Gas Machinery Company, of Cleveland, O., has been awarded contracts for silica retorts and settings, to be installed in the works at Ogden, Utah; Grand Junction, Cal.; and Sterling, Ills. The Gas Machinery Company now has a large number of silica retorts and settings in successful operation, all of which are giving the best of satisfaction.

MR. H. M. WALLACE and associates, of Detroit, Mich., are the likely ones to secure the franchise grant for the construction and operation of a gas plant at or in Corpus Christi, Tex. The tentative planning bases the cost of a suitable manufacturing and distributing system at this point at $100,000.

HINTS from Boston, Mass., are to the effect that the contract between the authorities of that city and the Rising Sun Street Lighting Company for the public lighting will be extended for a period of 6 months, from August 1, 1912.

The Market for Gas Securities.

"Off again," is the report for the week in connection with Consolidated gas, the trading shows a loss in that period of 1 per cent. in the bid price. It came in to-day (Friday) at 141 to 141½. It surely is cheap enough for anyone to take a try in it.

Brooklyn Union, on the other hand, is up ½ point, the figures showing 144 to 144½. The Company gains all the time in number of consumers, and in increase per capita. Certainly the latter is evidence of stability that brooks no cross-questioning. Peoples, of Chicago, in its rated price bears evidence of the cleverness with which Mr. Sullivan is holding down his job. Lacledes are attracting little attention, although the quoted figures should be positively tempting. The U. G. I.'s current quarterly dividend of 2 per cent. is payable the 15th prox.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JUNE 17.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	141	141⅛
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,500,000	100	165	175
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102⅝
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	109
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	144	144½x
1st Con. 5's, due 1948, M. & N.	15,000,000	—	105¾	107
Yonkers	200,650	500	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	8,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,580,000	—	—	50
Detroit Gas Co., 5's	881,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	138
" Bonds, 5's	10,500,000	—	104	106
Indianapolis	2,000,000	—	—	88
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	91	95
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	99	102
Laclede Gas Co., St. Louis	10,000,000	100	105	106½
Preferred	2,500,000	100	114	120
Bonds	10,000,000	1,000	102⅝	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,370,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	90¾	91
Preferred	25,000,000	100	94½	94¾
Montreal Gas Co., Canada	2,000,000	100	208	210
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	114	114½
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
Pacific Gas and Electric Co.	15,500,000	—	64½	65½
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	94	98

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, June 12, 1912.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15, 1912, to stockholders of record at the close of business, June 29, 1912. Checks will be mailed.

1932-4 LEWIS LILLIE, Treasurer.

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 16 to 18, 1912. Marlborough-Blenheim Hotel, Atlantic City, N. J. Officers: President, Ira C. Copley, Aurora, Ills. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting and Gas Show, Toronto, Aug. 26th to Sept. 7, 1912. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 1912. Officers: President, R. M. Searle, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Gas Meters.—Monthly meetings. Chairman, Will W. Barnes; Commissioners, W. H. Pettes, I. W. Peffly; Secretary, H. Thurston Owens, 42 Pine street, New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 19th and 20th, 1913. Chicago, Ills. Officers: President, H. O. Channon, Quincy, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Niagara Falls, Canada, Sept. — 1912, Meetings of Sections, monthly. Pres't, V. R. Lansingh, New York City; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.]

Indiana Gas Association.—Annual meeting, March, 1913, Indianapolis. Officers: President, Howard L. Olds, Indianapolis; Vice-President, Wm. Wallace, Lafayette; Secretary-Treasurer, Phimer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, Burlington, Ia., May, 1913; Officers: President, C. W. Fair, Atlantic, Ia.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October 17-19. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, September 4-6, 1912; Toronto, Canada. Officers: President, F. W. Blowers, Kalamazoo, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Joplin, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and Gas Show, Dec. 2-5, 1912. Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, ———— 1913. Boston. Officers: President, D. D. Barnum, Worcester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Summer Meeting. August 24, Atlantic City, N. J.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ———, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, May, 1913. President, Noel R. Gascho, Alva, Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Diego, Cal., September 17, 18, 19, 1912. Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April, 1913; Officers, President, H. H. Ganser, Norristown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 13, 1912; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, April ——— 1913, Charlotte, N. C. Officers: President, C. E. White, Montgomery, Ala.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April———1913, Galveston, Tex. Officers: President, F. M. Lege, Jr., Galveston, Tex.; Secretary, H. S. Cooper, Galveston, Tex.

Wisconsin Gas Association.—Annual meeting, May ——— 1913, Milwaukee, Wis. Officers: President, I. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.